

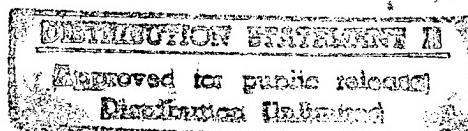
14 May 1993

FOREIGN  
BROADCAST  
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# ***JPRS Report***

# **Environmental Issues**

**DTIC QUALITY INSPECTED**



**19971229 028**

# Environmental Issues

JPRS-TEN-93-013

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### Dutch-Russian Venture Develops Functional Thermionic Energy Conversion System

93BR0411 Rijswijk POLYTECHNISCH WEEKBLAD  
in Dutch 12 Feb 93 p 1

[Article by Bart Stam: "Thermionic Energy on Its Way; Cooperation with Russian Institute Produces Breakthrough in Development at ADENCO (Advanced Energy Conversion)"]

[Text] Eindhoven—A completely new energy system is on its way. Thanks to a successful Russian-Dutch collaboration, the first central heating boilers and industrial burners to make use of thermionic energy conversion [TEC] will be ready by the end of 1993. The method is a revolutionary one in which heat is directly converted into electricity without involving any moving parts.

He who laughs last, laughs best. The expression is indelibly printed on Engineer L.R. Wolff's brain. Since 1978, he has been working on getting thermionic energy conversion off the ground by trial and error. He worked first as a researcher at the Chemical Physics laboratory at the Technical University of Eindhoven, and from 1987 with ADENCO (Advanced Energy Conversion), a company which he founded together with two partners.

#### Support

Shortage of funds, together with a skeptical attitude from large-scale industry in particular, have not been able to discourage Wolff from continuing with thermionic energy conversion. However, over the last few years, the prospects for ADENCO have become more hopeful. The Ministry of Economic Affairs has granted a technical development credit of 875,000 Dutch guilders to Energy Conversion Systems [ECS], the joint venture set up between ADENCO and the Russian IPPE (Institute of Physics and Power Engineering) in Obninsk.

In the meantime, the PNEM [Province of North Brabant Energy Company] has also promised financial support. The North Brabant energy concern is aware of the possibilities to be gained from installing both smaller and larger central heating boilers in private houses, greenhouse market gardening centers, and public buildings. That is why the PNEM intends to install a 50-KWe demonstration model this year at its new district office in Oss. According to Wolff, there is a very good chance that other energy concerns will jump on the bandwagon.

Honeywell and the metal company Philips Mecoma have already expressed industrial interest in the supply of thermionic systems components. At the moment, Honeywell is carrying out a market investigation, while Philips Mecoma is preparing a cost estimate for the mass production of the thermionic energy converter.

#### Edison

Thermionic emission is a physical phenomenon that was discovered by Thomas A. Edison. The famous inventor found that there is a difference in voltage between the

hot and cold filaments in a carbon filament lamp. Current TEC systems are based on this principle, which consists of a diode in which one electrode—the so-called emitter—is heated to about 1,450°C. At this high temperature, the emitter thermally emits electrons that are captured by the second electrode, or collector, at 600 degrees. The resulting difference in voltage forms the basis of the eventual production of electricity.

The principle of thermionic energy conversion appears to be very simple, but according to Wolff a great deal of technological development is necessary to produce workable systems. He gives as an example the emitter's material, which, because of the high temperatures, must be chosen very carefully in order to obtain the correct heat transfer. Wolff and his coworkers developed the Cermet emitter in 1980, which consists of wolfram and lanthanum chromate, a project for which they received the BP [British Petroleum] Energy Prize in 1982.

Wolff calls the collaboration with IPPE an important breakthrough in TEC's development. For years, this institute has been at the absolute top in the Soviet Union in the field of nuclear energy. IPPE worked under the greatest secrecy on the development of a thermionic nuclear reactor, which could successfully be used to power military spy satellites.

Since then, the institute has for the greater part switched over to civilian research. Nevertheless, 300 of the 10,000 employees are still working on TEC. "That is more than in the rest of the world put together," said Wolff. In 1988 he was approached by Dr. Valery Yaragin, head of the IPPE's thermionic laboratory, about working together. "He knew that here in Eindhoven we had gained experience in materials development for smaller flame-heated TEC systems. That fitted in well with their knowledge of larger devices." The contact resulted in the foundation of the Energy Conversion Systems joint venture in August 1991.

#### No Complaints

The Dutch-Russian cooperation can be called sensational. While ADENCO has taken care of the financing and management, IPPE has been carrying out a great deal of the research. There are no complaints to be heard from Wolff, only enthusiastic stories about technological collaboration with Russia. "As managing director of ECS, I go on average once a month to Obninsk. The self-motivation of the staff there is impressive. Because 50 well-trained people are working full-time for ECS, IPPE can work on different aspects at the same time. That would be virtually impossible in the Netherlands. Above all, it would cost us so much more in salaries."

#### Supplementary

ECS has three trumps in the final mass production of TEC systems. The first is the relatively small-size central heating boiler for use in private houses. The second, a large central heating boiler for the greenhouse market garden industry, for instance, or nursing homes. The

third one is the development of the industrial burner. All cases involve applications of up to 125 kWe. "Above that capacity, we are defeated by conventional heat/power units, which are more efficient for the time being." The efficiency of TEC systems (10 percent) is, according to Wolff, restricted by the transfer of radiant heat between emitter and collector. "TEC systems are, however, an excellent supplement to existing heat/power units in systems with smaller power requirements," he

said. He mentioned as advantages the limited maintenance due to the lack of moving parts, no noise nuisance, and less discharge of NO<sub>x</sub> and CO<sub>2</sub>. It remains to be seen, however, whether the total market for thermionic systems in the Netherlands is really as large as 3,000 MWe, as the Heat & Power Project Bureau has calculated. "Among other things, that will depend on the costs of mass production," said Wolff, who will not venture to make a prophecy on this point.

**NPC Committee Chairman Discusses Environment**

*OW2404051493 Beijing XINHUA Domestic Service in Chinese 0243 GMT 13 Apr 93*

[Interview with Qu Geping, chairman of the NPC Environmental Protection Committee, by XINHUA reporter Zhu Youdi (2612 1635 2769); place and date not given: "A Choice to Make in the Face of the Global Tide of Environmental Protection—an Interview with Chairman Qu Geping"]

[Text] Beijing, 13 Apr (XINHUA)—The protection of the human environment has been going on for 20 years. In China, environmental protection, a kind of work about which few people knew anything at the beginning, has developed into a great undertaking that is unfolding on a magnificent scale. In environmental protection, Qu Geping, chairman of the Environmental Protection Committee of the National People's Congress [NPC] has always been one of the vanguard. This reporter recently interviewed Qu Geping and asked him about the domestic and international situation in environmental protection.

Qu Geping said: The past 20 years have witnessed great vicissitudes. As a result, tremendous changes have taken place in the domestic and international situation in environmental protection. People have greatly enhanced their awareness of the importance of environmental protection, and the global tide of environmental protection is surging ahead each day. In China before 1972, it was said that "a socialist country has no pollution." But now environmental protection has become a basic policy of our country. Environmental protection, like tackling the population problem, is a major task bearing on the rise and fall or life and death of the Chinese nation. The party and the government attach great importance to this task, and hundreds of millions of people across the country concern themselves with it and understand and support it. A decision of the just-concluded NPC session to establish an environmental protection committee marked the beginning of a new development stage the undertaking of environmental protection in our country had entered.

Qu Geping said: We are advancing toward the turn of the century. The "Agenda for the 21st Century" adopted by a UN conference on environmental protection and development maintained: Mankind is at a historical juncture to make a choice. We should change or formulate our policy for sustained development according to our knowledge of the effects of mankind's activities on the environment, so that we will be able to have a safer and more prosperous future. Our country is not so prosperous and cannot afford to spend more money tackling pollution problems. However, we have found a way to protect the environment by emphasizing control. In this regard, we have provided useful experiences to other developing countries, winning praise from the international community.

A graduate of Shandong University, Qu Geping first majored in Chinese literature and then switched to the study of chemistry. He has devoted himself to the cause of environmental protection for many years. During these years, he has not only gone around campaigning for this cause but also presided over the formulation of a number of major policies for environmental protection, thus solving the problem of environmental pollution [as transmitted], a problem of concern to many people. So he is worthy of the highest award for international environmental protection which the United Nation conferred on him. Qu Geping said: We should soberly realize that our situation in environmental protection is still very grim. The tasks in the treatment of pollution and control of ecological damage are still very arduous. Generally speaking, environmental problems remain serious and tend to worsen, and people are worried about the prospects in this regard.

On the major environmental problems which are perplexing us, Qu Geping said: At present, air pollution is serious in China's urban areas. With coal as the major energy source, we emit 13 million tonnes of smoke and 15 million tonnes of sulfur dioxide annually, exceeding the urban air pollution standards set by the state. Acid rain zones around some cities in southwest and south China have shown a tendency toward expansion in recent years. Some urban sections of rivers and lakes are polluted. Some lakes and harbors are becoming seriously eutrophic [fu ying yang hua 1381 3602 7402 0553], causing more red currents [6375 3390]. The utilization rate for our solid industrial wastes is low. While the worsening tendency of ecology has not yet been brought under control, the ecology is suffering more and more damage across the country. Soil erosion, grassland degeneration, and the erosion of land by sand are serious. There are frequent poachings of precious wild animals and indiscriminate gathering of precious wild plants.

On environmental prospects for the next century, Qu Geping said: In the 21st century, China will enter a new period of accelerated modernization and enhanced overall national strength. There will be both rigorous tests and great hopes for its environmental situation. The present economic development and population growth situation could lead to two possibilities in the environment of the 21st century. One is that we from now on correctly handle the relationship between the environment and development, further improve environmental management, and increase investment in environmental protection. As a result, we will be able to attain the environmental objective for this century by the year 2000, the environment of most cities will become clean and beautiful by the year 2030, overall environmental quality will be remarkably improved, and the ecological environment will become better and better. The other possibility is the opposite, with an even worse environmental situation which will pose a great threat to people's lives and health and obstruct economic development. We should strive for the first possibility and avoid the second one.

Qu Geping, full of confidence in China's environmental protection efforts, said: We have already preliminarily opened up an avenue for environmental protection with Chinese characteristics. Now we should seize the opportunity, constantly sum up the experience of success, meet new challenges, and create good conditions for the economic development and environmental protection in the next century.

### **Song Jian Addresses International Ecological Conference**

*OW2404020393 Beijing XINHUA Domestic Service in Chinese 0449 GMT 13 Apr 93*

[By XINHUA Reporter Zhan Dexiong (6124 1779 7160) and KE JI RIBAO Reporter Xu Jiuwu (1776 0046 2976)]

[Text] Madras, India, 12 April (XINHUA)—The International Conference on Ecological Environment and Rural Employment opened here today. Chinese State Councilor Song Jian, who is also the minister in charge of the State Science and Technology Commission, attended the opening ceremony and was invited to deliver a speech entitled "The Spark Plan and Rural Employment."

Introducing the objectives of the Spark Plan, he said: Initiated in 1985, the Spark Plan was designed to establish a greater agricultural system in China's vast rural areas through the encouragement of modernizing agriculture, animal husbandry, and forestry; various applied technologies; and coordinated industrial development. The plan has set three goals: The establishment of demonstrative enterprises, the provision of appropriate technologies for the development of village and town enterprises, and the training of a score of new-type peasants and leading rural enterprise entrepreneurs.

Touching on relations between the environment and development, Song Jian emphasized: Since the United Nations' Environment and Development Conference held in Rio De Janeiro in Brazil, a global consensus has

been reached: Mankind needs a kind of sustained development conducive to the environment. As far as sustainability is concerned, currently, theories have been diverse. In measuring the "sustainable living standard safety index [chi xu sheng huo shui ping an quan zhi shu 2170 4958 3932 3172 3055 1627 1344 0356 2172 2422]," the variables of economic efficiency and ecological safety should be placed on a prime position. Henceforth, in implementing the Spark Plan, we should focus on rural employment, the development of productive forces, and ecological safety—with the placement of survival and development in the prime position.

In a later part of his speech, Song Jian highlighted the effect of the Spark Plan on agricultural development. He said: Since the plan was implemented six years ago, more than one million scientists and technical personnel have been attracted to rural areas annually to convey new technologies to village and town enterprises. Up to the now, 35,000 leading projects under the Spark Plan have been completed nationwide, bringing at least one professional training program to over 10 million peasants.

He said: Currently, there are more than 19.1 million registered village and town enterprises in China, creating 100 million new job opportunities for the peasants. The fixed assets of China's village and town enterprises have reached 50 billion yuan, with their production value accounting for a quarter of gross national product and 20 percent of the state's total export, respectively.

The conference was jointly organized by (Sivaminasong,) a famous Indian agricultural expert and international activist, and a research foundation named after him. Renowned experts from 12 countries, including China, India, Japan, the United States, and Sweden; chairman of the Cadanian International Development Research Center; president of the United Nations University; as well as representatives from other international organizations attended the conference.

Song Jian and his entourage arrived in India's southern port city of Madras on 11 April. They will also visit Indian capital New Delhi.

## NORTH KOREA

### China Possible Mediator Over NPT Withdrawal

PM1504101193 Moscow *IZVESTIYA* in Russian  
14 Apr 93 First Edition p 3

[Report by Vladimir Skosyrev: "Pyongyang Exposes 'Intrigues' of Moscow and Washington"]

[Text] Beijing—After Tokyo protested the burial of nuclear fuel waste from Russian submarines in the Sea of Japan, Pyongyang immediately joined the voices denouncing Moscow.

Accusing Russia of polluting the world environment, DPRK radio put this question to listeners: What right does Moscow have to criticize us for withdrawing from the nuclear Nonproliferation Treaty if it is secretly depositing nuclear waste into the sea?

In brief, the problem of the Russian nuclear submarines has become a trump card for Pyongyang in its campaign aimed against its former older brother and ally in the socialist camp. Actually, in attacking Moscow North Korea still does not spare Washington. The DPRK Foreign Ministry has published a statement claiming that it was the United States, through nuclear blackmail and pressure on the International Atomic Energy Agency [IAEA], which compelled Pyongyang to withdraw from

the Nonproliferation Treaty. Therefore the UN Security Council should examine the conduct of Washington, not Pyongyang.

To judge by the bellicose tone of North Korea's propaganda tirades, it does not intend to make any concessions. But the East Asian states are not ceasing their efforts in the hope of settling the dispute by quiet diplomatic methods. In this connection observers were greatly interested by the report that next week the foreign ministers of China and South Korea will hold talks in Bangkok during a UN commission session.

This will be the first meeting of the heads of the two countries' diplomatic departments since North Korea announced its withdrawal from the Nonproliferation Treaty. The South Korean ambassador to China said that the main subject of the talks will be the nuclear problem on the Korean peninsula. In the ambassador's opinion China is the only country which can give the DPRK "friendly advice" to return to the ranks of signatories of the treaty and make its peace with the IAEA.

North Korea depends on supplies of oil, coal, and food from China. In addition Beijing has won the North Korean rulers' gratitude for opposing the UN Security Council's application of sanctions against Pyongyang. So that it cannot be ruled out that China may ultimately assume the role of mediator in settling the conflict over the North Korean nuclear program.

**BULGARIA****DDT and Intrathion 'Piled' in Khaskovo Region**

*AU1604164493 Sofia BTA in English 2053 GMT  
15 Apr 93*

[“Today”—BTA lead]

[Excerpts] Sofia, April 15 (BTA)—As President Zhelyu Zhelev and EC Commissioner Hans van den Broek looked on, parliament voted today to approve unanimously an act ratifying the Europe agreement on Bulgaria's association with the EC and the interim agreement on trade and related matters between the EC and Bulgaria.

The central National Bank of Bulgaria today put into circulation a set of one silver (500 leva), one gold (5,000 leva), and one platinum (10,000 leva) coin, commemorating Bulgaria's association with the EC. [passage omitted]

Acting on a public prosecutor's warrant, the police in Blagoevgrad (southwestern Bulgaria) yesterday seized a publication of the outlawed nationalist Ilinden United Macedonian Organization, entitled “Skornuvane” (“Awakening”), from Ilinden's leader Yordan Kostadinov. The seizure was motivated by the fact that the publication, just as the publisher, are not registered.

The National Assembly Budgetary and Finance Committee today considered the key parameters of the draft budget. The passage of the National Budget Act will be completed in the first week of May, according to the deputy chairman of the committee Stefan Stoilov. In this way, Bulgaria will honour the commitment assumed to the International Monetary Fund. The procedure of drafting an arrangement with the IMF will take a further four weeks or so, and Bulgaria will probably sign it in mid-June, Mr. Stoilov hopes.

For his part, Prime Minister Lyuben Berov said on his return from Copenhagen today that the budget will be adopted before the end of April.

Colonel Arlin Antonov, director of the National Security Service, insisted to the National Assembly Committee on National Security that his service's budget be separated from that of the Interior Ministry or that 10 percent of the spending for the Interior Ministry be set aside for the National Security Service.

At today's meeting of the National Security Committee, the Civil Defence Service asked for 50 million leva in addition to the 128 million leva allocated for it in the draft budget.

The Ministry of Foreign Affairs also asked for a sizable increase of its budget allocation at a meeting of the Foreign Policy Committee.

At a private meeting today, the Radio and Television Committee decided that nearly 100 million leva more

should be budgeted for the Bulgarian National Television and another 75 million for the Bulgarian National Radio. [passage omitted]

The prices of government-monitored staple foods grew 1.63 percent between March 31 and April 15. The steepest rises affected weaned lamb meat (10.4 percent) and poultry (5.9 percent), the National Statistical Institute said.

The chairman of the Agrarian Party of the Republic of Macedonia Dimitar Galev ended his visit to Sofia. He discussed opportunities for trade in farm produce and, more specifically, for export of early vegetables to the Bulgarian market. [passage omitted]

Nearly 260 tonnes of unusable pesticides are piled up on the territory of Khaskovo region, the regional civil defence reported. They include quantities of DDT and Intrathion, which have long been barred for use as highly toxic. Other chemicals are with expired validity, and still others lack labels and have not been identified yet. [passage omitted]

The commission of inquiry into the causes of the serious industrial accident at the Dunarit Military Works near Ruse on March 19, 1993, in which five persons were killed, submitted its findings to the prosecutor's office in Ruse (on the Danube, north central Bulgaria). The commission found that the explosive had been handled in violation of the occupational safety rules and requirements and that in-house control had been inadequate and ineffective.

The municipal clerks' strike in Sofia is unlawful because their demands are of no trade-union nature, Mr. Dimitur Bongalov, chief of the Local Administration and Public Order Department of the Council of Ministers, told the press today. He reported that 14 Sofia borough councils today submitted a declaration to the government, saying that the strike will continue unless the cabinet starts negotiations with them immediately.

In a declaration addressed to the president, the workers at the Arsenal Military Works in Kazanluk (central Bulgaria) warned that they were going on strike alert in protest against the chronic failure to pay them their monthly wages, the breach of government contracts and mobilization reserves and the non-receipt of proceeds from completed transactions. To sort out their problems, the military works employees' trade unions want to meet the prime minister by April 21 and that action be taken to redress their grievances. [passage omitted]

**SLOVAKIA****Majority of Slovaks, 14 Percent Ethnic Hungarians Favor Gabcokovo-Nagymaros Project**

*AU1904132493 Prague CTK in English 2033 GMT  
15 Apr 93*

[Text] Bratislava April 15 (CTK)—A public opinion poll has revealed that 60 percent of Slovaks and 14 percent of

ethnic Hungarians wanted the Gabcikovo-Nagymaros water project on the Danube to be put into operation regardless of a ruling by the International Court of Justice in The Hague.

25 percent of the questioned Slovaks and 14 percent of Hungarians living in Slovakia would accept the decision from The Hague. One percent of Slovaks and 10 percent of ethnic Hungarians want the construction to be halted.

## ROMANIA

### MER Leader Favors Completion of Cernavoda Nuclear Plant

AU1504094893 Bucharest ROMPRES in English  
0646 GMT 15 Apr 93

[Text] Bucharest (ROMPRES) 15/4/1993—Under the theme "Nuclear Power—an Ecological Alternative for Romania?" the Ecology Movement of Romania [MER] organised on Wednesday, 14 April, in Bucharest a colloquium attended by experts of the Nuclear Physics Institute, of the RENEL [National Electricity Network] and of the National Control Commission of Nuclear Activities.

Petrica Sandru, an expert of the Institute of Nuclear Physics and vice president of the Ecology Movement of Romania, pointed out that his party is showing in its platform-programme its position for the completion of works on the nuclear power plant of Cernavoda. In the opinion of Mr. Sandru, each political party in Romania should clearly state the position concerning the nuclear issue.

Referring to the nuclear power plant of Cernavoda, Petrica Sandru raised some questions on behalf of the Ecology Movement of Romania concerning the ecological impact, on effective ways of intervention in case of nuclear catastrophes, the training of the working personnel of the plant, the observance of national and international norms regarding the ensurance of nuclear security.

In their answers, the experts pointed out that their option for the reactor at Cernavoda is the result of some positive conclusions of a joint Romanian-Canadian study. They insisted on the need to financially and effectively support the completion of works and pleaded for the coming back to Romania of Romanian experts in nuclear field which are currently unfolding their activities abroad.

**ARGENTINA****Foreign Minister Monitors Exclusive Maritime Zone**

*PY1504032893 Buenos Aires NOTICIAS ARGENTINAS in Spanish 2229 GMT 14 Apr 93*

[Text] Buenos Aires, 14 Apr (NA)—Foreign Minister Guido Di Tella today flew over the Exclusive Economic Zone of Argentine territorial waters and the contiguous area to observe control operations over fishing activities and to verify possible violations by foreign vessels.

According to the Foreign Ministry, Di Tella flew over the zone aboard an Argentine Navy "Electra" plane, headquartered in Trelew, which is used for the oversight and control of Argentine waters.

The foreign minister's intention was in particular to "observe the activities carried out in the contiguous area by foreign fishing vessels from distant countries, namely from Europe and Asia."

According to the Foreign Ministry, the trip has revealed "the government's firm decision to adopt, with countries whose fleets fish in that zone, protective measures to preserve the living resources of Argentine waters."

Di Tella's decision was adopted because during this time "there is very intensive fishing of squid, which species is found in large amounts in this maritime zone, where a large variety of other types of fish are also exploited intensively."

The communique released by the Argentine Foreign Ministry also mentions hake, "a predominant species in Argentine waters, and which is very much appreciated in foreign markets."

"These species are abundant in this zone because of the configuration of the Argentine continental shelf, which goes beyond the outside limit of the exclusive economic zone all along the extension of the zone," the Foreign Ministry stated.

All these fish resources move "from one side to the other of the outside 200 mile limit, in addition to which they form a part of the trophic chain of species in the Exclusive Economic Zone."

For this reason that the Foreign Ministry believes that "indiscriminate fishing would cause a depredation of the resources over which Argentina has sovereign rights."

"The preservation of these species is a special concern of the Argentine Government, which is pursuing intensive negotiations in the appropriate international forums to achieve the recognition of the obligation of countries that fish in that zone to cooperate with the coastal state in the preservation of the species," it stated.

The ministry also recalled that next week "the preparatory session of the UN conference on species whose

territories are found within and outside the Exclusive Economic Zone, and on highly migratory species, will be held in New York."

Tomorrow at 1530 Di Tella will hold a news conference in the military section of the Metropolitan Airport to further explain the flight carried out today.

**MEXICO****Trade Agreement Negotiations on Environmental, Labor Issues Continue**

*PA1404165493 Mexico City Canal 13 Television Network in Spanish 1215 GMT 14 Apr 93*

[Text] The third round of supplementary negotiations of the North American Free Trade Agreement on the issues of environment and labor began on 13 April. Herminio Blanco Mendoza of Mexico, Rufus Yerxa from the United States, and John Weekes, the heads of the three nation's delegations, met at the customary triangular table.

Mexico came to the talks with the basic stance that the sovereignty of each nation will be respected during the negotiations. Our country has affirmed that there will be no supranational negotiations. John Weekes said he is an optimist by nature. Herminio Blanco pointed out that the time has come to analyze the details. Norma Samaniego, deputy secretary of labor and a member of the Mexican delegation, said that the talks are moving forward on the labor issue. Santiago Onate Laborde, federal prosecutor for environmental matters, said that Mexican environmental laws are quite competitive.

Republican Senator Pete Domeneci, from New Mexico, after meeting with President Carlos Salinas de Gortari, said that sovereignty is not on the negotiating table.

**NICARAGUA****Commentary Urges Policy To Save Forests**

*93WN03604 Managua LA PRENSA in Spanish 24 Mar 93 p 14*

[Commentary by Alvin G. Salinas Valle]

[Text] Over the past 40 years 4 million hectares of forests have "disappeared" in Nicaragua; this is equivalent to twice the land mass of El Salvador. If this pace continues, in 15 years we will no longer have economically important forests.

What do forests contribute to the nation's economy?

If the lumber industry stopped operating for one year and we had to buy on the world market the products that we now extract from our forests, we would be looking at a \$150 million bill, almost 60 percent of the value of our current exports.

This estimate in terms of foreign exchange does not include the contribution that forests make as the main regulator of our water supply system and climate, in conserving the soil, etc. Their value here is difficult to estimate.

We can all see the pathetic deterioration of our forests, which are being exploited in an unplanned, uncoordinated fashion using wasteful technology that is more than 30 years old and that, on the average, "makes use of" 30 percent of each log that enters a sawmill.

Migratory agriculture, for its part, generally does not include the use of lumber for building and other purposes. It slashes and burns, "clearing" the land for planting. The woodcutters or charcoal makers do their part in the dry forests and in the mountains near settlements.

In our cities, public-service messages call on people to save electric power, since oil means foreign-exchange outlays. Of course we have to conserve oil! But don't we know that the main source of electrical energy in Nicaragua is firewood?

Firewood accounts for 55 percent of the nation's electric power, while petroleum derivatives supply 35 percent.

Yet there are no campaigns to conserve firewood or to restore the extensive forest land that is being turned into firewood year after year. What is in store for us in 15 years if we keep up the current pace of cutting down and exploiting our forest resources?

Economic development policies must be brought in line with suitable environmental policies. International lending agencies so recommend, and in Nicaragua's case this truth has dramatic overtones.

Officially, the Government of Nicaragua has lent its support to the Conservation Strategy for Sustainable Development and the Forestry Action Plan, which was drafted under the supervision of the Institute of Natural Resources and with the interinstitutional cooperation of the Nicaraguan Institute of Energy, the Nicaraguan Institute of Territorial Studies, the Nicaraguan Institute of Mines and Hydrocarbons, MEDE [expansion not given], etc. But we have yet to see tangible action and results from this huge effort at research and assessment.

We have well-founded proposals and thorough technical studies. What is lacking is willpower and unified action from government agencies, private enterprise, and the various civic associations that seek to halt the depletion of our resources.

The point is not to adopt a messianic or altruistic approach. Protecting our forests today and supporting the reforestation of dry areas is an urgent utilitarian need that will benefit the country economically.

Halting the agricultural frontier, making more efficient use of our forests, and replanting them is an urgent task. Fifteen years down the road will be too late.

### Committee to Propose Methodology for Management Plan for Miskito Keys

93WN0360B *Managua BARRICADA* in Spanish  
27 Mar 93 pp 1, 6

[Article by Guillermo Cortes Dominguez]

[Text] Miskito Keys, Puerto Cabezas—Some 20 miles northwest of Puerto Cabezas, opposite the coastal Miskito communities (Sand Bay, Dakura, Ahuastara, and Pahara) lies one of the most beautiful and least known places in Nicaragua, some 80 islets scattered over an area of 40 kilometers around the main key.

These keys belong to a unique system of reefs that extends as far as Belize. Along with a 20-kilometer-wide strip of coastline from Wounta to Cape Gracias a Dios, they have been part of a marine biology reserve since an October 1991 government decree.

They are the Miskito Keys and are considered one of the biologically richest marine coastal areas in the Americas. One unique feature is that they are home to an underwater grass on which the green tortoise feeds.

Most of the green tortoises in the Caribbean spend nine months feeding in the Miskito Keys, after which they leave to lay their eggs in Costa Rica, an age-old ritual whose origin is unknown.

We flew quickly over the main key, which has been covered with 20-year-old mangroves; the previous ones were leveled by a hurricane in 1971. Almost in the middle lies a freshwater lagoon.

Among the mangroves can be seen roads that look like rivers, linking the entire large yet unsteady islet, which consists of several small lagoons and muddy areas known as wetlands, where no species of crocodile lives owing to the lack of a sandy beach.

The Miskito Keys are a habitat of the manatee, an endangered species that used to be the main source of food for the crews of the British vessels that arrived on the Atlantic Coast in the 17th and 18th centuries. Seventy-one manatees were counted in 1992, 43 in March and 28 in June.

Thirty-seven Gray River dolphins were also counted; they are found only between Panama and Chile.

The waters immediately surrounding the keys are shallow, just one or two meters deep, and are clear enough to see the ocean floor. They are ideally suited for diving, as they are full of rocks and coral.

### A Primitive Venice

The keys are a huge seasonal habitat for large flocks of migratory birds, of which more than 50 species have been counted. The most beautiful is the pink heron (it looks like a flamingo). One of the largest Central American populations of this heron lives here.

Sixty-seven species of mollusks, 141 species of fish, 14 species of amphibians (including one that is new to science), and 25 species of reptiles have been identified. In addition, 25 species of orchids and 11 species of bromeliads have been found.

The Miskitos have managed to live for centuries in harmony with this ecosystem by making use of the fauna and flora and not harming the environment.

These keys contain one of the richest lobster banks in the New World Atlantic. On a normal fishing day, hundreds of divers can be found in the area, as well as some 20 fishing boats, most of them Colombian and Honduran, and all of this is leading to overfishing.

We also flew over a key north of the main island, which divers call "Maras" but whose real name is "Morrison Dennis." This is the quaintest of the keys, as 23 rustic wooden homes stand on stilts jutting out of the shallow, clear-blue waters surrounding it.

These are the homes in which the divers sleep after returning from an exhausting day of catching lobster in caves or under rocks. It is a "primitive Venice."

As we returned to Puerto Cabezas, we saw another fascinating sight: two homes sitting in the middle of the immense ocean, erected on a light brown reef that could be barely made out under the turf piles.

#### Fifty Thousand Miskitos

From the air one can see several green spots below the water. These are the underwater grasses that attract the famous green tortoises of the Caribbean. Around the keys can also be seen some dark green circles formed by an astringent substance, exuded by the mangroves, that is commonly used to tan leather.

The 8,500 square kilometers of the reserve are home to almost one-third of the Miskito population of Nicaragua, that is to say, some 50,000, who live in 23 communities.

The efforts to ensure appropriate management of the biological reserve in the Miskito Keys received a major boost this past 2 July, but it was not until last week that the interinstitutional commission that oversees the area succeeded in setting up a technical committee that will soon propose the methodology for drafting a management plan.

This management plan will determine the comprehensive use of the keys, from a scientific, socioeconomic, and cultural perspective alike, with particular attention to the Miskito community.

This ambitious project (there is still no management plan for the areas that have been declared part of the reserve) has the support of the United Nations Program for the Environment, the World Wildlife Fund, the Caribbean Conservation Corporation, the International Development Agency, and the Indian Law Resource Center.

The local counterpart consists of representatives of 13 national bodies headed by the Institute of Natural Resources and the Indian conservation group MIKUPIA [expansion not given], the regional government, YATAMA [Indian military organization], the Institute for Atlantic Coast Development, the Sandinist People's Army, the Interior Ministry, etc.

The idea, or rather the dream, is to develop the Miskito Keys comprehensively so that they become a major attraction for international environmental tourism. For example, no other place in the world can offer divers such splendid natural beauty.

Wouldn't you like to feast your eyes on these reefs with their coral and hundreds of ocean species?



Key:-)1. Miskito Keys-)2. Caribbean Sea

## PANAMA

### Ship Runs Aground, No Chemical Spill Reported

PA1304041493 Panama City Circuito RPC Television in Spanish 2300 GMT 12 Apr 93

[Report by Victor de la Hoz]

[Text] The captain of Fertility L, a ship involved in an accident on 10 April at the Pedro Miguel locks, said on 12 April chemicals did not leak in the canal. The Fertility L is carrying 30,000 tons of chemical products, however, Panama Canal Commission [PCC] authorities have remained silent concerning the exact type of chemical products being carried by the ship.

Nevertheless, repair work on two cracks on Fertility L's hull continued on 12 April. The two cracks appeared after the ship ran aground at the Pedro Miguel locks on 10 April. The ship was coming from the United States en route to Japan with 30,000 tons of chemical products. No one has been able to ascertain what type of toxic material is aboard the ship.

This type of ship has a double hull so its chemical cargo is intact and no spill has occurred. The ship was moved to Paraíso's docking station, located on the west side of the canal, to start provisional repairs so it can continue its journey. More than 14 frogmen who work for the

private company in charge of the repairs are in the area, accompanied by PCC personnel.

[Begin repair technician Arie Van Bueren recording] We have lots of problems because visibility is poor—whenever we have any visibility. We have no visibility to work under water so this slows down everything. The PCC demanded the implementation of security procedures. We can only work when ships are not crossing in front of us. [end recording]

RPC Television's news crew boarded the Fertility L and was able to talk with one of its officers, who said there is no danger of contamination in the area.

[Begin recording] [Unidentified captain] We have told you the ship is safe due to the ship's structure, meaning it has a double hull. Therefore, the cracks, meaning the damage, are in the outer hull rather than the inner hull, where the cargo is located. Understand? There is no danger, as far as we are concerned.

[De la Hoz] What kind of cargo does the ship carry?

[Captain] Many kinds—about five or six different kinds of cargo.

[De la Hoz] What is its current cargo?

[Captain] What?

[De la Hoz] What kind of chemical product is the ship carrying now? Is it toxic?

[Captain] Yes, it is toxic. [end recording]

Meanwhile, a PCC spokesman reported the authorities have suggested the adoption of security measures at the Miraflores potable water plant, which is located close to the site of the accident, until the proper investigation is carried out.

Referring to this topic, authorities of the National Water and Sanitation Institute [IDAAN] said they had to reduce production at the Miraflores potable plant.

[Begin IDAAN official Fernando Rios recording] Production was reduced by half so we had to compensate for this in the old sector of Panama City and the area of Arraijan, meaning the areas which receive water from the Miraflores plant. We had to supply water from the Chilibre plant to certain low areas of Panama City's old sector. That is why we could not supply water to many sectors located on higher ground. [end recording]

The PCC is expected to offer an official report on the accident, which could have had fatal results given the highly dangerous toxic products being carried by the Fertility L.

## PERU

### **Oil Prospecting Threatens Environment, Native Population**

PY3004011793

[Editorial Report] Lima LA REPUBLICA in Spanish on 9 April carries on pages 12 and 13 a 1,000-word article by Francisco Reyes entitled "42,000 Natives Threatened with Extinction" on the "ravaging effects" of oil prospecting and seismic exploration on the ecosystems of the Upper Maranon region, which in turn "poses a threat to the survival of Aguaruna and Huambisas Indians." LA REPUBLICA employees visited the area and confirmed that "the environment has been seriously damaged."

The "natives" complain that "despite its pledge to protect the environment, the Petromineros company has destroyed many native species of trees" used for food, medicine, and construction. "The blasts have frightened off game and other animals, and now the natives have to go four days into the jungle to hunt an animal." Moreover, powerful explosive charges detonated near rivulets and streams, as well as the din caused by helicopters, also have "destabilized the ecological balance of the Upper Maranon region."

The article reports that on 23 October 1990, Petromineros of Peru, a subsidiary of the American company Edward Callan Interest Inc., signed an agreement with Petroperu, State Petroleum Agency, whereby the latter granted the former a license to prospect for oil in Plot

No. 50, a vast area that extends as far as Ecuador and includes the Maranon and Santiago river basins.

The article reports that, acting on behalf Mobil Oil Inc., Petromineros hired the services of the Halliburton Geophysical Services and Sereal companies to prospect for oil in the valleys of Biabo, in San Martin.

The article notes that before Petromineros started its operations, native leaders submitted a document to the company in which they asked it to protect the environment. At the beginning Petromineros managers seemed agreeable but then rejected the request "on the grounds that they had the consent of the Peruvian Government." "With the support of a detachment of troops stationed at Upper Maranon, the company started its operations."

The article reports that a study on the project's environmental impact shows that 18 percent of the native population is anemic and 14 percent has tuberculosis, and indicates "this will surely be aggravated by the food shortage caused by the ravages of Petromineros in the region."

The same publication on the same day carries on page 13 another 600-word article by Francisco Reyes on "the growing rift" between the two factions of the Upper Maranon region's native population, which "surfaced when Petromineros started prospecting for oil in the region."

Reyes notes that "those who have been assimilated and Westernized" are in favor of economic development and believe oil companies will be "instrumental in boosting the region's development." The other faction, made up by "those who have remained true to their traditions," believes that oil companies will bring not only about "a detrimental effect on the environment" but also threaten their "ancestral autonomy."

The writer further reports that this rift also stems from "a generation gap" between young students who "face a grim future" and the heads of families "rooted in the jungle."

The article states that this situation is compounded by the fact that a group of natives "seriously questions the actions of Aguaruna and Huambisa Council members and harbor an obvious grudge against members of the Society of Jesus, who have been living in the region for decades," because the council chairman is very close to the Jesuits, who granted him a scholarship to study in Great Britain. The Jesuits are accused of "sowing the seeds of division among the natives" by advocating that "they integrate into the Church and the group of settlers and foreigners."

The article further reports that social and generational differences are fueled by "persistent aggression from the outside that has taken on a most pernicious slant;" prostitution, alcoholism, drug trafficking, and crime, which did not exist before and are becoming a "growing threat to these native communities."

To conclude, the article cites the comment of an old Indian, who said: "They want to impose Lima's development, squalor, poverty, hunger, slavery, and violence on us. We do not want that. We won't forego our forest with its animals and fish, our way of life, which is that of our fathers and forefathers."

## CHILE

### Plan Submitted To Apply UN Biological Diversity Convention

PY2804181993 Santiago LA TERCERA DE LA HORA  
in Spanish 13 Apr 93 p 16

[Article by Irene Strodtboff]

[Text] After presenting a diagnosis and national action plan to protect our country's flora and fauna, Chile yesterday became the first Latin American country to apply the Convention on Biological Diversity signed during the Earth Summit [UN Conference on the Environment and Development]. This was reported by Rafael Asenjo, executive secretary of the National Environmental Committee [Comision Nacional del Medio Ambiente] (Conama).

Asenjo indicated: "Chile is the first country in Latin America—and the second country in the world—to develop this work."

About 500 government, university, and research group professionals concentrated for two years on issues such as legislation on and education about biodiversity, increasing the ecological staff in wild areas protected by the state, and the conservation of ecosystems and areas that create goods and services such as fishing, forestry, and agriculture.

The proposal will be discussed by state, private, and academic circles within the next two months.

The proposal's 50-page text, divided into four sections, reports a lack of coordination between the ministries and public institutions on biodiversity, scarce reports on this issue, and the low number of available studies.

The ceremony was attended by representatives of institutions such as the Industrial Development Association (Sofofa), the Council of Chilean University Rectors [Consejo de Rectores de las Universidades Chilenas], and the U.S. International Development Agency (IDA).

**INDIA****Natural Resources Management System To Be Created**

*BK1504094293 Delhi All India Radio Network in English 0830 GMT 15 Apr 93*

[Text] India is all set to make remote sensing technology operational. According to Space Applications Center sources in Ahmedabad, with this end in view, a national natural resources management system is being implemented under the aegis of the Planning Commission. The Department of Space is the nodal agency. Under the program, several schemes have been launched by central ministries and state governments.

**IRAN****Polluting Soap Factory Closed**

*93WN0335A Tehran ABRAR in Persian 24 Feb 93 p 9*

[Text] Karaj-IRNA. A soap factory affiliated with Jahan's Vegetable Oil Manufacturing Enterprises was ordered closed down by the public prosecutor's office in Karaj for polluting the environment.

An official of the Environmental Protection Agency of Karaj stated: Before the issuance of this decree, numerous warnings had been dispatched to the Jahan's Vegetable Oil Plant to comply with the procedures for cleaning and purification of pollutants, however, the said manufacturing unit ignored all the warnings and did not take any action to correct the problem.

The aforementioned soap factory formerly transferred and dumped its pollutants on the outskirts of Mehr-shahr. Following this unhygienic practice, which threatened to pollute subterranean waters, Mehr-shahr municipal's office together with the Environmental Protection Agency joined hands to stop the continuation of this violation.

Furthermore, a plant for the production of fish glue in the district of Mehr-shahr which was closed down as a result of polluting the environment, started operating illegally.

With proper notification from the officials of Karaj Environmental Protection Agency, the director of the aforementioned plant was charged with illegal re-opening of the plant and referred to the judicial authorities for criminal prosecution.

## RUSSIA

### **Tomsk-7: Failure To Protect People Questioned**

*PM1504153993 Moscow Russian Television Network  
in Russian 1900 GMT 14 Apr 93*

[From the "Vesti" newscast: Video report from the village of Georgiyevka by A. Pelt and G. Goryunov, identified by caption]

[Text] [Pelt] As if to show mercy to a city of half a million people, the radiochemical leakage from Tomsk-7 took its toll on this godforsaken village of around 40 houses. Hot particles invisible to the naked eye have settled on roofs, roads, and gardens. Ten minutes before our arrival a decontamination team entered the village. According to the locals, they have been working here for three days now. Every bit of land is painstakingly checked meter by meter. Soil and snow reflecting an elevated radiation level are placed in polythene bags. But this picture does not inspire peace of mind. Above all you have to ask why it is that the decontamination operation began just three days ago, instead of 6 or even 7 April. Why is it that the local inhabitants—even if there are only 40 or 50 of them—were not told of the danger on 6 or 7 April? Why is it that the decontamination workers, who go home in the evenings, are dressed in special clothing while adults and, more importantly, children who live here permanently wander around the very same areas as if nothing had happened? What is most frightening of all is that the kids play in the snow. Let them accuse us of inflaming the situation yet again, but we journalists simply don't understand this. [Video shows decontamination team walking around village collecting samples, children and locals looking on]

### **Chelyabinsk's Provisions on Incoming Nuclear Material, 'A Start'**

*934F0493A Chelyabinsk CHELYABINSKII RABOCHIY in Russian 6 Mar 93 p 2*

[Report by M. Fonotov: "Who Is Closer to the Atom? The Nuclear Shield Is Heavy and Dangerous"]

[Text] The local authorities would like to know what happens on the territory over which they have authority. They would like to know, and they even should know. They should know absolutely everything that occurs within their boundaries.

So the oblast authorities are obliged to have all of the information, first and foremost if they recognize their own responsibility for the lives of the millions of people living in their own region. Of course, the highest authority also carries a certain responsibility for the fate of our oblast, but it is the local authorities first. They are closer. They are here, with us. The authorities themselves with their families and children and grandchildren.

Unfortunately, here in the oblast for many years events took place of which hardly anyone knew. Sometimes

someone would report something. Let us assume it was to the top man. And after the event. And it was made known. But the decisions were reached far away and high up.

Here in the oblast they built plants and cities, created research institutes and design bureaus, produced output, output that is very dangerous, and moved trains with lethal cargoes—strictly in secret from us. For considerations of some kind of advantage and convenience, or even for no reason at all, one oblast, while its inhabitants remained in total ignorance, was crammed with nuclei and poisons. And even when the contagion covered the cities and villages in a cloud, or flowed into the rivers, no one explained it to us; they remained silent and, offering us no chance to collect ourselves or resettle us in different places.

Fate. That was how it was perceived. But our fate was decided not in heaven, but in departments in the capital, which listed us as casualties in a very facile manner, devalued our lives, and wrote them off.

That was how it was. Some things have changed, but by no means all.

Now we know that the Mayak nuclear center is here. The first, and one of three. (The other two are Tomsk-7 and Krasnoyarsk-26, an underground mining and chemical combine on the Yenisey). We have an All-Union Scientific Research Institute for Industry [VNIIP] (Chelyabinsk-70)—a scientific research center that develops the latest kinds of nuclear weapons. We have an instrument-building plant (Zlatoust-36) that produces particular kinds of nuclear weapons.

In addition, within the oblast several closed cities have been built, at which nuclear weapons and their components are stored, including two large base warehouses for nuclear weapons (Chelyabinsk-115 and Zlatoust-20). A very large formation of strategic rocket forces with nuclear weapons housed in silos is located in the south of the oblast. Special facilities have also been created for mobile strategic land-based nuclear weapons systems. Transit shipment of nuclear weapons is accomplished across the oblast using various kinds of transport.

The South Urals is the workshop, proving ground, and arsenal for nuclear weapons. There is no doubt that the oblast is overloaded with them. Moreover, disarmament, which should have given hope, is making things more complicated by creating new (return) flows of nuclear weapons, new processes for handling them, and, finally, new problems associated with warehousing and storage of nuclear materials.

It is common knowledge that spent nuclear fuel from nuclear power plants (including nuclear power plants abroad) and power reactors from the nuclear fleet are being shipped into the oblast. Finally, nuclear weapons are being returned for dismantling.

Essentially, we are densely surrounded by nuclear materials with various properties and of various designations. What kind of potential is there for handling this, and how well is it being organized?

Of course, it is not a question of opening everything up just on demand. On the contrary, our extraordinary openness is already beginning to be a cause for concern; there is danger in this. We seem to be "undressing" more readily in front of strangers than we do in front of our own people. However, the local authorities should have an opportunity to judge the situation in the oblast, first and foremost from the standpoint of safety.

Proceeding from all of this (and not this alone), on 27 January 1993 the oblast soviet of people's deputies adopted the decision "On Interim Provisions for the Legal Regulation of Matters Pertaining to Importation Onto Oblast Territory of Nuclear Materials, Nuclear Installations, Sources of Ionizing Radiation, Radioactive Waste, and Radioactive Substances of Natural and Artificial Origin and Their Use and Storage on Oblast Territory."

The title of the decision is long and, naturally, it is not only difficult to repeat it, but even to grasp its meaning. But I think that its idea is understandable for everyone: The oblast authorities are insisting on their right, and they should know all the nuclear events in the oblast, and have levers to influence them and in general keep hold of the situation. The decision states that "Chelyabinsk Oblast is a high-risk zone for nuclear and radiation incidents," which cannot help but concern people. The local authorities are not laying claim to intervention in all aspects of the "nuclear economy," but are interested in only one aspect, namely, the population's standard of living and safety. The risk that threatens our life, and at the same time robs us, is degrading and insulting.

A working commission has been set up, and it has drawn up draft Interim Provisions and will be in business until the problem is brought to a logical conclusion. The commission is led by a member of the Inner Soviet, V.I. Kalashnikov, who now, when the Interim Provisions have been adopted at the oblast level, is bringing them to the attention of those "at the top" and those "at the bottom."

The oblast soviet has assigned the working commission that drew up the Interim Provisions, the economic council (A.D. Kaunov), and the state-legal department (Yu.P. Inozemtsev) to draw up proposals for a treaty between the Government of the Russian Federation and Chelyabinsk Oblast on matters pertaining to the legal regulation of activity at state facilities in Russia's nuclear complex located on the territory of the oblast.

Here it is stated, "In the event of a refusal by the Government of the Russian Federation to enter into a treaty with Chelyabinsk Oblast, the oblast soviet reserves the right to suspend the activity of facilities in the nuclear complex."

The Interim Provisions constitute the first document of its kind. Since the capital is in no hurry to adopt legal enactments of this kind, the province has taken the legislative initiative (it has been granted this right). The provisions are called interim precisely because they will be in force until Russian laws have been passed on this issue. And now, when the Interim Provisions have been adopted in Chelyabinsk, they may be rescinded only by the Supreme Soviet or the Constitutional Court.

The Chelyabinsk Oblast Soviet has an absolute moral right to these fine-sounding words, because the country's first radiation accident occurred on the territory of the South Urals in 1957, and the Techa River "resonates" to this day. Today, those who were to blame and who bear the responsibility for those regrettable events are not to be found. And unfortunately, the law "On Social Protection for Citizens of the Russian Federation Suffering as the Result of Radiation Contamination" has still not been passed. No one is willing to assume responsibility and pay for past accidents. But neither can anyone see an end in the event of new disasters if, God forbid, they occur.

So what should we do, just sit and wait for the "crash"? We hope that there will be no crash, that we shall avoid nuclear disaster, that all we will have is our fears, even though no one has become healthier through fear. If we remain silent and leave everything to the discretion of a center far away, then, as is the custom, we will be surrounded on every side and will be unable to take a step.

I repeat that the Interim Provisions are a complex thing to read, but properly speaking, their essence is simple. Perhaps three points are enough.

The point on licenses. This states that in order to engage in any activity connected with nuclear power, organizations, enterprises, and individuals must have permission (a license) in accordance with the laws of Russia.

The point on agreement. This emphasizes that agreement for a license is mandatory with the oblast soviet of people's deputies upon representation from the oblast administration.

One other point, on quotas. It is stated thus: "Importation onto oblast territory of spent nuclear fuel for reprocessing and storage from facilities located in the Russian Federation shall be accomplished on the basis of a decision of the oblast soviet upon request from the oblast administration in the form of an annual quota, with mandatory conclusion of a special contract with the reprocessing facility." With respect to spent nuclear fuel from nuclear power plants built by us abroad, its importation should be agreed with local organizations.

Incidentally, a year ago the oblast soviet established payment for the reprocessing of spent nuclear fuel from foreign nuclear power plants.

"Yes," emphasizes V.I. Kalashnikov, "that is so. And last year, for the first time in its history, Mayak paid 600 million rubles and \$2 million into the oblast budget."

As they say, there is precedent. To put it more simply, a start has been made. This means that it will also continue. If we are placed at risk, if someone besides ourselves is turning to us with spent nuclear fuel, then they have to pay. At least that.

The Interim Provisions are the voice of the oblast to the higher spheres of power, our note letting it be known that we intend to live long on our own land, and that we intend to protect ourselves and not permit ourselves to be disregarded. Elementary justice is needed: As much as we give to others, they should give to us. There is no room for "extremes."

There can be no doubt that the people of the South Urals support the decision of the oblast soviet on the Interim Provisions. The more so since in this matter the oblast soviet and administration are acting in agreement.

#### **Chelyabinsk Ecology Chief on 1992 Reforms, Mixed Results**

*934F0493B Chelyabinsk CHELYABINSKIY  
RABOCHIY in Russian 27 Mar 93 p 2*

[Interview with V. Bakunin, chairman of the Committee on the Ecology and Natural Resources, by M. Fonotov; place and date not given: "The Reforms and the Environment"]

[Text] [Fonotov] Vasiliy Aleksandrovich, for several years now you and I have summed up the results of environmental work for the year. The year in line now is 1992, the year of the reforms. I hope that the results have been summed up. What kind of results were they? Strange as it may seem, the environment is gaining from the economic recession, for example, from the cutbacks in production and the closure of units. In general, however, the environment also loses in conditions of crisis.

[Bakunin] Of course. The economic situation has made nature conservation work more complicated. So not everything that we outlined has been achieved. True, the trend of previous years was maintained: Overall emission of toxic substances into the atmosphere last year declined by 240,000 metric tons. Only 100,000 metric tons were from the introduction of nature conservation measures; the rest was from the cutbacks in production. True, the amount of 100,000 metric tons was written into the program for reducing emissions. I might add that 48 new gas scrubbers have been put into operation on existing equipment, 141 units have been reconstructed, and 430 units have been repaired.

[Fonotov] How is it shared out?

[Bakunin] Magnitogorsk, where emissions have been reduced by 124,000 metric tons, is in the lead.

[Fonotov] Incidentally, three open-hearth furnaces were to have been withdrawn from operation at the Magnitogorsk Metallurgical Combine. What happened to them?

[Bakunin] Three open-hearth furnaces were withdrawn from operation in 1992, and one in January this year.

[Fonotov] And at Chelyabinsk? Is there less smoke?

[Bakunin] There is less smoke, but only 30,000 metric tons less.

[Fonotov] And the Chelyabinsk Metallurgical Combine?

[Bakunin] The Chelyabinsk Metallurgical Combine has reduced emissions by 20,000 metric tons. Mainly through cutbacks in production.

[Fonotov] Last year a gas scrubber was to have been installed at ESPTs-3 [Electric Steel Smelting Shop-3] at the Chelyabinsk Metallurgical Combine.

[Bakunin] The work has not yet been completed. Startup was postponed to this year.

[Fonotov] Like the startup of ESPTs-6?

[Bakunin] Yes, the new shop is being set up. And since it has not gone on line, the furnaces at the old ESPTs-1 are smoking as before.

[Fonotov] There is another long-drawn-out problem—electrode production at the Chelyabinsk Electrometallurgical Combine [ChEMK].

[Bakunin] By a decision reached at a session of the oblast soviet, electrode production should be closed down in 1994. With a gradual cutback in the production of electrodes to 10,000 metric tons, that is, down to the needs of the oblast. In 1991 the ChEMK produced 17,000 metric tons, and virtually the same last year. At the time that the question of closure was considered, the electrode production facility was producing more than 27,000 metric tons.

[Fonotov] The production is harmful, but the electrodes are necessary....

[Bakunin] Yes, these kinds of electrodes are now produced nowhere in Russia except at Chelyabinsk. Without them, the electric furnaces at metallurgical enterprises would come to a halt. What to do? Note that here, the collective is also against closing down production. People are prepared to risk their health, as long as they are not left unemployed.

[Fonotov] This means that closing down is not enough. And you cannot close down the shop or factory first and then think about its replacement. An old, harmful production facility can be closed down only after new units have been built. Otherwise, the people themselves will start to protest the closure. Is not something like this happening at Karabash?

[Bakunin] At Karabash we closed down the furnaces after a program was drawn up and approved to alter the profile of the combine. But this program is not being implemented. The profile of one furnace has been altered, but there is no copper scrap for it. Now the plant management is asking to open another shaft furnace and a converter. We will not give permission for this. Even the furnace that is in operation should be closed down, because the permit that was granted is expiring. We could have extended the period for a year if construction of the new gas scrubber had been completed this year at the combine.

Karabash is not now what it used to be. Let me remind you that emissions used to exceed 160,000 metric tons. This has been reduced by a factor of 10. The solution is obviously not to return to what used to be. If the combine restarts operations, the fines that it will be paying will eat up all the profits.

[Fonotov] So what is the solution?

[Bakunin] It is necessary to build a new production facility. At Karabash a small enterprise has appeared that is proposing to recover metal from dumps and mine water. Finally, the best scenario is to build a plant along the lines of the Klyuch joint-stock company proposal.

[Fonotov] Vasiliy Aleksandrovich, for two years we have been talking about an automated system to monitor atmospheric pollution.

[Bakunin] I am happy to report that we have made significant advances toward the goal in this matter. The theoretical part has been concluded. A start is being made to introduce the system. In about three months here in the committee we shall have installed computers and instruments to monitor the radiation situation. First in the northern part of the territory and Chelyabinsk city, and later throughout the oblast. All operational information will flow there from sensors set up at the local level.

Then we shall move on to monitoring the chemical status of the atmosphere. This is more complicated. We wanted to place sensors on every smokestack, but this is expensive and not very reliable. Another plan was adopted, namely, placing sensors on each square kilometer of territory being monitored, that is, in the vicinity of industrial enterprises.

[Fonotov] Who is dealing with this? Who is making the instruments, and who will install them?

[Bakunin] We have a contract with the design bureau [KBM] in the city of Miass. And it has a subcontractor. In all, 11 institutes and organizations are involved, including Chelyabinsk-65 and Chelyabinsk-70.

[Fonotov] And who is paying?

[Bakunin] This is through the funds from the federal budget used for rehabilitation of the oblast, and also from the oblast environmental fund.

[Fonotov] Thank you for the good news. Now we must talk about our reservoirs. Has the Miass become cleaner, and the lakes in the oblast?

[Bakunin] Unfortunately, we have not kept to the program, but there has been a reduction in emissions of waste water—24 million cubic meters last year. This is 3.7 percent of all waste runoff. There have been remarkable achievements. For example, at the Chelyabinsk TETs-1 heat and power plant, thanks to the introduction of a hydrolysis system for waste water being discharged into Lake Shelyugino, discharges have been reduced by 4 million cubic meters. The same system at TETs-2 makes it possible to reduce discharge into Lake Pervoye by 10 million cubic meters.

We have been building purification plants at Troitsk for a long time, about 10 years. Finally, under pressure from us and with our help, they have been put into operation. The Uy River has become cleaner.

The Ural Automobile Plant has been working well for the environment. With the startup of the southern purification plants, discharge of waste water into the Miass River has been reduced by 1.7 million cubic meters.

[Fonotov] I must ask: How are economic levers working with respect to the environment?

[Bakunin] They are now the chief levers. Persuasion does not work with everyone. And reprimands do not scare everyone.

We have set up an environmental fund here in the oblast, and it handles all the accounts with the enterprises.

[Fonotov] Who handles this fund, the committee?

[Bakunin] No, it is separate, independent. It is a legal entity. It has an executive director—Nina Ivanovna Khizhnyak. As far as the distribution of funds is concerned, this is done on a public basis by the fund board.

[Fonotov] Are there problems with payments?

[Bakunin] There are. There has been a sharp increase in the number of legal entities. Previously, we used to collect payments from 576 enterprises, but now there are more than 2,000. There are many new ones, including small enterprises. In addition, the old ones are being split up. For example, previously the construction trust had one account, but now one has been opened for each of its departments.

I would like to report that new normatives have been approved this year. They are significantly higher than the old ones. In addition, in regions overburdened with industrial production, permission has been granted to introduce coefficient two—this is for the Ural region. That is, to double the normatives. Finally, in zones of environmental disaster, yet another double coefficient can be applied.

[Fonotov] And how much did the fund receive last year?

[Bakunin] Under the old normatives, enterprises had to pay 800 million rubles [R]. Some R60 million went to the oblast fund. Some people still owe. Many were exempted from payment. First and foremost those who are building nature conservation facilities. We are convincing managers that it is more profitable to build purification plants than to pay into the fund.

[Fonotov] Forestry is a difficult problem.

[Bakunin] Forestry preservation is a fight. In particular, the "epopee" about saving Group 1 forests at Miass is over. The city leadership prepared a letter to the government asking permission to fell forests of the first category—at reservoirs and for erosion protection. A total of 770 hectares. Of these, 380 hectares were a buffer zone for the Ilmen Reserve and the Miass River catchment area, and to prevent erosion. This forest should never come under the axe. We did a great deal of work. We tried to convince and tried to prove. Finally, we shot movie footage of the forest. And only then, when the deputies saw what we were talking about, did they support us. True, they did succeed in felling 14 hectares to establish orchards.

Now we are preparing materials to allocate land for the reservoir zones of the Sim and Yuryuzan Rivers. Other preservation documents are being drawn up. Thanks to them, in the last four years the estimated amount of timber felled has shrunk from 2.2 million cubic meters to 1.46 million.

In fact we have very little forest that can be felled. What is left is mainly along roads. But in the mountains the forest has been felled. And the consequences are unfortunate. Reforestation is going badly. This was convincingly shown in a film we shot from a helicopter. In some places that have been felled, the soil is washed away and nothing is left but bare rock. We are trying to establish a scientific basis for felling. For example, pine is now felled when it is 80 years old. But it turns out that it grows intensively and gains wood for another 20 years. This means that it is necessary to increase the age of pines that are felled, and it is the same for other species.

[Fonotov] Vasiliy Aleksandrovich, the public's attention was drawn to environmental issues some years ago. Now, however, we see that the "wave" has subsided. The environment has been made a second or third, or even a lower priority. Do you feel this in your work?

[Bakunin] I have felt this since mid-1991. People are not now concerned with nature. They do not think about the air that we breathe, but about bread and milk. The living standard is falling and the incidence of disease is rising. It is a question of survival in the direct sense. Those active in nature conservation work have remained, but in general the public has to some extent removed itself from the environment.

In general there are just as many complaints from the public. As before, people are still concerned about the environmental situation. But there is less noise. The

demonstrations have stopped. Those who used to call people to demonstrations for some reason are not showing concern about this. They have become deputies. They have been given their posts, moved their apartments, and calmed down. Now the environment does not worry them.

#### Japan Plans To Give Assistance in Storage of Radioactive Material

OW1204135693 Tokyo KYODO in English 1343 GMT  
12 Apr 93

[Text] Tokyo, April 12 (KYODO)—Japan will tell Russia this week it will offer technological assistance in the storing of nuclear materials like plutonium metal after the dismantling of nuclear weapons, government sources said Monday [12 April].

The sources said the policy will be announced by Prime Minister Kiichi Miyazawa in a keynote address at the opening of a foreign and finance ministers' conference of the Group of Seven (G-7) major industrial nations on aid to Russia, due to start Wednesday in Tokyo.

Miyazawa will express Japan's readiness to offer about 1.2 billion dollars in emergency aid to Russia, including about 40 million dollars in such technological assistance and about 1 billion dollars in trade insurance coverage.

The aid package will also include additional loans from the governmental Export-Import Bank of Japan and grant aid for humanitarian purposes.

The sources said Japan will transfer to Russia technology relating to a management and monitoring system in a nuclear materials storage facility to be built there.

Japan will also provide Russia with knowhow on land-based storage of radioactive waste such as reactor parts, so as to enable Russia to stop dumping such waste in the Sea of Japan.

#### Possible Agreement To Probe Radioactive Conditions of Sea of Japan

OW1304145493 Tokyo KYODO in English 1437 GMT  
13 Apr 93

[Text] Moscow, April 13 (KYODO)—Russia applauded Japanese Foreign Minister Kabun Muto's announcement on Tuesday that Japan would not link its economic aid to Russia to a long-standing territorial row over Russian-held islands off Japan's northern shores.

Sergey Yastrzhembsky, director of the Russian Foreign Ministry's Information and Press Department, told a news conference that Muto took "a responsible and constructive attitude" by saying Japan was temporarily breaking from its long-time position of linking the two issues.

The ministry spokesman made the comments one day before the Group of Seven industrial nations is to kick off debate in Tokyo on a package of economic aid for Russia, for which Japan has been under international pressure to maximize the size of its contribution.

In 1945, in the waning days of World War II, the Soviet military overran four islands off Japan's northernmost main island Hokkaido—the Habomai group of islets, Kunashiri, Etorofu and Shikotan islands—and expelled the Japanese populace.

Yastrzhembsky also indicated that Russia may agree to probe the current condition of radioactive waste and aged nuclear submarine reactors, which a Russian Government report said were dumped by the former Soviet Union into the Sea of Japan and waters in Russia's Far East region.

He said the Russian Government may conduct such a probe with assistance from such neighboring countries as Japan and South Korea.

### 'Deterioration' in Technical Safety

*LD1304174393 Moscow ITAR-TASS in English  
1707 GMT 13 Apr 93*

[By ITAR-TASS correspondent]

[Text] Moscow April 13 (TASS)—The technical safety situation has not improved at Russian enterprises, a meeting of the Russian Federal Mining and Industrial Inspection with participation of inspection regional bodies' heads was told here today.

The meeting stated the deterioration of technical safety in the mining, oil, gas, chemical, petrochemical and oil processing industries, as well as at gas supply facilities.

A total of 652 persons died at enterprises supervised by the State Technical Safety Inspection and 430 accidents were registered. Twelve train crashes and accidents and over 1,000 other incidents, the majority of which resulted in leakage of dangerous and poisonous substances, were reported in railway transportation of dangerous cargo.

Blasting operations at mining enterprises are done in violation of safety rules, and explosive materials, received from defence industry conversion and not properly inspected, are used.

The safety situation did not improve in the first quarter of 1993. The rates of traumas and production accidents increased by nine and 28 per cent correspondingly as compared to the first quarter of 1992.

### Strategies for Attracting Western Assistance Viewed

*93WN0373A Moscow ROSSIYSKIYE VESTI  
in Russian 13 Apr 93 p 7*

[Article under the rubric "Investments" by Yevgeniy Nikolayevich Zyrin, department head of the Main Administration of Sector and Investment Programs and Projects of the Russian Agency for International Cooperation and Development: "Ecological Programs: Will the West Help Us?"]

[Text] Whereas the danger of nuclear self-destruction of mankind has been significantly reduced by the efforts of all rationally thinking people, ecological catastrophes one right after another continue as before to come crashing down upon people, now in one, now in another region of the globe. The paradox of this situation lies in the fact that those who are fighting for a clean environment would seem to have no opponents. Everyone agrees that the pollution of our environment is a common calamity, and only common efforts will be able to eliminate it. At the same time, the economically developed countries strive to stand aloof at times, hoping to preserve order and cleanliness only in their own homes.

Understandably, those who would wish to contribute hundreds of millions of dollars towards the modernization and reconstruction of harmful production facilities in a neighboring country, we must state directly, are few in number. At the same time, we know that we face a critical need to resolve these most complicated ecological problems. How then can we introduce revitalizing foreign injections into this extremely important sphere? I see several possible ways.

The first is to conclude agreements on the governmental level with respect to ecological programs of interstate significance. An example of this can be seen in the understanding reached between the governments of the Russian Federation and Finland on joint environmental protection measures. These envisage the construction and reconstruction of enterprises in Karelia, in Leningrad, Murmansk, and Pskov oblasts, and in St. Petersburg. Russian and Finnish engineers will jointly conduct the design work. Among the priority projects: construction of purification facilities and a plant for processing complex waste products, modernization of the sewage system, erection of sulfur-removal facilities at the Kostomuksha Ore Dressing Combine, and complete reconstruction of the combines Pechenganikel and Severonikel, located in Murmansk Oblast.

The governments of Norway and Sweden are also vitally interested in improving the operation of these huge plants which are absolutely poisoning the environment of the entire northern portion of Europe. At a certain stage it would be advisable to conclude similar agreements with them as well.

Another alternative would be to include environmental protection projects which have been developed by particular Russian enterprises, and even sectors, within broad-scale programs which are being planned and accomplished by international technical and financial organizations. Broad ties with such institutions have already been established by the Russian Agency for International Cooperation and Development and by the Commission on Matters of International Humanitarian and Technical Assistance of the Russian Federation Government. It is important to keep in mind that the financing of ecological programs is viewed in the West as a priority matter with respect to investment of capital in Russia's economy.

A third possibility is the creation of joint enterprises or joint-stock companies which would themselves be able to assume the obligation of resolving particular ecological problems in specific regions and at specific enterprises. For example, to process a second time the "residue" of enrichment factories, treat metallurgical slag or other industrial waste products. It is a secret to no one that advanced technologies permit the extraction of a tremendous amount of useful components, including ferrous and nonferrous metals, from what would seem to be absolutely useless scrap.

And here Russian enterprises have something they can use to attract the attention of Western capital. For example, four metallurgy combines situated in Orenburg Oblast accumulated more than 175 million tonnes of slag residue and 40 million tonnes of "raw material residue" not processed a second time. The Orenburg people have neither the manpower nor—more importantly—the funds to efficiently dispose of all this wealth. After all, preliminary estimates alone indicate that expenditures on these projects would amount to \$200 million. But the same estimates show that in just five years, investors would be able to recoup their investments with interest.

More alluring still are proposals of the Cheboksary ecology enterprise Nime, related to the processing of toxic waste from local industry. This project could be recouped very rapidly, insofar as it envisages the sale abroad of those ferrous metals which could be extracted over the course of the technological process. No small amount of initial hard-currency capital is required to launch the project which promises so much, however.

Finally, exchange could be effected through barter of the enterprise's production output for foreign equipment which is necessary for "ecological purification" of the production facility. A mass of problems could arise of course in the implementation of this proposal, related to obtaining licenses and quotas for exporting production output and removing customs duties and restrictions. And indeed, it is unfortunate that products for barter are available for offer mainly by the raw material ore sectors, and not as often by the metallurgy and oil-refining industry.

Even today, however, many of our enterprises are not waiting for instructions or assistance from above, but rather have themselves begun to work out terms with Western partners for the delivery of equipment to implement specific ecological projects. We can see a great many examples of such practice already. Interest has been shown, for example, in environmental protection measures for such Russian giants as the Magnitogorsk, Novolipetsk, Nizhniy Tagil, and West Siberia Metallurgy Combines and Kostomuksha Ore Dressing Combine, or the joint-stock company Tulachermet, by such "big shots" of Western business as Krupp-Koppfe and Lurgi (Germany), Voest-Alpine (Austria), Tampele (Finland), Kurita, Mitsui, and Sumimoto Kindzoku (Japan), and Flucht (Sweden).

Time will tell how cooperation in these and other projects will develop. The important thing, in my view, is a realization on the part of the Western world that Russian problems, especially in the ecological sphere, are truly common problems, and that in helping Russia today, European countries guarantee themselves clean air and drinking water and fertile soil for times to come.

It is a worthwhile game, as they say.

### Kuzbass Region: Yeltsin Told That Ecological Situation Will Improve

*LD1304185993 Moscow Ostankino Television First Channel Network in Russian 1700 GMT 13 Apr 93*

[Video report from Kuzbass by correspondent Nikolay Chirkov—from the "Novosti" newscast]

[Excerpts] In this ecological disaster zone—thus have Russian ecologists diagnosed the Kuzbass region—there are many enterprises urgently in need of reconstruction. These include the Kuznetsk Metallurgical Combine which Boris Nikolayevich Yeltsin visited this afternoon. [passage omitted on output, pollution, plans for improvement] [video shows metallurgical plant, Yeltsin getting out of car, meeting workers]

The main thing, and the Russian president paid particular attention to this, is that there will be an improvement in the ecological situation. There will be a decrease in the amount of effluents which literally choke the city with smoke and gas. [video shows Yeltsin conversing with white-coated personnel, then attending meeting]

Doctors at the city's largest maternity hospital also told Boris Nikolayevich about the need to pay increased attention to protecting the health of Siberians, where the density of industrial enterprises approaches the critical mark. There is a shortage of medicines, modern hospitals and clinics, and medical equipment. The need to pay more attention to social programs was also stated by the participants in a roundtable meeting which ended Yeltsin's visit to the Kuzbass. [passage omitted]

### Russian Nuclear Waste Dumping To Continue in Sea of Japan

*OW1504232093 Tokyo NHK General Television Network in Japanese 1050 GMT 14 Apr 93*

[From "News 7" programm]

[Text] Two senior officers of Russia's Pacific Fleet who were directly involved in the dumping of radioactive waste into the Sea of Japan granted an exclusive interview to NHK. They stated that regarding the liquid waste, there is no other alternative than to continue the disposal for at least four more years. Meanwhile, regarding the solid waste, they disclosed that ocean dumping will be suspended immediately and that the waste will be disposed of at ground facilities instead.

Moreover, regarding a survey of the possible contamination in the Sea of Japan, the Russian officers welcomed the idea of promoting a joint survey with Japanese experts. However, they stated that it would first be necessary to reach an accord at the governmental level.

### **Parliament Adopts Law on Handling Radioactive Waste**

*LD1404204993 Moscow ITAR-TASS in English  
2004 GMT 14 Apr 93*

[By ITAR-TASS correspondent Lyudmila Yermakova]

[Text] Moscow April 14 (TASS)—A draft law "State Policy on Handling Radioactive Waste" was adopted after its first reading at a Russian Federation Supreme Soviet House of Nationalities session today. Earlier it was passed by the House of Republics.

Thus the Russian Parliament has reaffirmed its attitude towards the problem which demands a "legislative regulation of relations in the sphere of guaranteeing safety at all stages of handling radioactive waste."

Commissions and committees of the Supreme Soviet have been entrusted with the task of submitting their comments and suggestions for considering the document during its revised reading.

### **WESTERN REGION**

#### **Ukraine: State Funds To Be Used for Environmental Monitoring, Coordination of Facilities Needed**

*WS2204115793 Kiev KHRESHCHATYK in Ukrainian  
14 Apr 93 p 6*

[Report by Tatyana Larina: "To Escape Ecological Evil"]

[Text] For the first time ever, some 84 million karbovanetses [K] were granted to the Ministry of Environmental Protection for scientific research in the last quarter of 1992. This money was used for drafting an ecological monitoring system, its main goal being to create a safe environment. A seminar of ecologists, held in Kiev, discussed the use of these funds.

Ihor Brayevych, head of the Ecological Monitoring Department of the Ukrainian Ministry of Nature, said at the seminar: "While summing up the results of our work in 1992, we have come to a conclusion that we need a strict coordination of our activities. The monitoring system, which is aimed at creating a comprehensive picture of the ecological situation in the country, is based on a large number of monitoring facilities, scattered all over Ukraine. These facilities are under different departments and are often tasked with different projects. This leads to incompatibility of data and thus, to low reliability of conclusions made on their basis. What we need is a clear picture of what is going on in all the areas of

Ukraine, whether on the steppes, the mountains, or at sea. We cannot have a realistic picture of the state of our soil, air, and water without profound knowledge of the influence on nature of cement factories, river and sea shipping companies, city transport, and farms. This means that we are unable to foresee and evaluate the threat, and take appropriate measures in order to prevent a crisis."

This is why the work on creating an ecological monitoring system has begun with inspections. Areas that already had some tangible results, like Dnepropetrovsk or Zaporozhye, were given money for buying mobile monitoring stations, laboratory and computer equipment.

This year, another K500 million are to be granted by the state budget for the continuation of the process. The inspections will be completed, technical assignments will be drafted, and on their basis the system itself will be built. The work will initially be carried out in the most ecologically tense regions—the Dnieper and Sub-Dnieper areas, the Crimea, Kiev and Lvov oblasts. In these areas we must create a model of an ecological monitoring system, which would facilitate management of the process of creating safe living conditions on Earth.

#### **Ukraine: Map Made of Post-Chernobyl Radioactive Areas**

*WS2704082893 Kiev KYYIVSKA PRAVDA  
in Ukrainian 15 Apr 93 p 3*

[Interview with E. Sobotovych, head of the Department of Radiological Geochemistry at the Ukrainian Academy of Sciences, by M. Kravchenko: "There Will Be Enough Work On the Contaminated Area"—first paragraph is introduction]

[Text] It has been seven years since the day of the Chernobyl tragedy. Scientists representing many institutions have been working on the issue of minimizing the aftermath of the accident. Among them are the staff of the Institute of the Geochemistry and Physics of Minerals at the Ukrainian Academy of Sciences. Two years ago, several departments were created here in order to deal exclusively with Chernobyl problems. Not long ago, Professor E. Sobotovych, chief of the newly created Department of Environmental Radiological Geochemistry reported at a session of the Academy Presidium on the results of research on the radioactivity of the Ukrainian environment. The team headed by Professor Sobotovych drew up a detailed radioecological map—the world's first.

[Kravchenko] Aside from Cesium-137 and Strontium-90, the destroyed reactor leaked other long-lasting active substances. Could you tell us more or less how advanced the process of their disintegration is and which of these substances are long-lasting?

[Sobotovych] Some 25 percent of short-term active substances have disintegrated in the last seven years. Strontium-90 and Cesium-137 will disintegrate over the next 30 years, while transuranic elements, including plutonium, americium, and others will live for a few thousand years. Research shows that a couple of hundred kilograms of plutonium have leaked into the environment. Its disintegration period is 24,000 years. It was mainly the 30-kilometer zone that suffered the fallout of this active element. Scientists are still not sure how it will behave in the future, or whether it will contaminate water. Our experts are working on this problem. Analysis shows that after the contaminated forest was buried in the 30-kilometer zone, the wood started to rot, and now plutonium is mixing into organic combinations. It may migrate with these combinations into subsoil waters. Earlier, the speed of the radionuclides' movement was assessed at two to three meters a year. Some day, the active elements may reach the Prypiat and Dnieper riverbeds.

[Kravchenko] The scientists working at the Radiological Geochemistry Department created the first-ever radioecological map. Could you tell us about the process of its creation?

[Sobotovych] Our scientists drafted a method of drawing up such a map on the basis of the Lutizh test range. Academician V. Shestopalov led the research. He is also the head of the Cartographic Committee of the Chernobyl Institute. A territory 20 by 20 kilometers in Vyshgorodskiy and Ivankovskiy rayons was chosen as the basis for the map. Hundreds of thousands of samples were taken from a layer of soil two meter thick using a special method. This was later repeated along the whole "western path" of the radioactive fallout. It is 20 kilometers wide and stretches as far as 400 kilometers through the territories of Kiev, Zhitomir, Rovno, and Volyn Oblasts. The map gives information on where it is expedient to develop industries and other infrastructure.

Today new maps are being drawn up within the institute's framework. They include aggregate doses, efficient equivalent soil contamination levels, and radioecological safety. The method of drafting the first map type has been established, and these maps are being drawn up under the supervision of Professor I. Likhtarev. Other maps will reflect not the density of general contamination caused by the Chernobyl accident, but the distribution of the forms of contamination which are the most easily assimilated by plants, thus being especially hazardous to human health. In order to efficiently use Ukrainian territory for economic development, it is necessary to carry out ecological and radioecological mapping on a scale of 1:200,000. This can be done only within a national program in the next 10 to 15 years. The absence of a data base is one of the main obstacles on this path.

[Kravchenko] How is the problem of disposing of nuclear waste being solved in Ukraine?

[Sobotovych] Five active nuclear power plants are the chief producers of nuclear waste. Almost 4 million of cubic meters of solid waste have been gathered during decontamination work in the Chernobyl area. A nuclear waste dump for these kinds of substances from all over the Soviet Union was once built in Krasnoyarsk District. Not long ago, Russia adopted a decree banning the shipment of radioactive substances to its territory. Our scientists are currently drafting a concept and plan of actions to be taken in this field. If urgent measures are not taken right away, we will have to close down some of our nuclear power plants, because their depositories will be overflowing with nuclear waste.

## CAUCASUS/CENTRAL ASIA

### Armenia: Government To Begin Work To Repair Nuclear Power Plant

OW1304165993 Moscow INTERFAX in English  
1627 GMT 13 Apr 93

[Following item transmitted via KYODO]

[Text] The Government of the Republic of Armenia has resolved that primary work is to begin on launching the Armenian Nuclear power plant, Interfax was told at the Government press service. In particular, ministries and institutions are to provide the plant personnel with food, transportation and medical services.

Specialists estimate the Armenian plant will start generating electricity in no sooner than one and a half year's time.

The plant was shut down following broad public protest after the earthquake of December 1988, although it suffered no damage. The authorities decided that the controversy over its re-launch would be resolved via referendum. This March, however, parliament, following persistent requests by President Levon Ter-Petrosyan, allowed the government to settle the issue on its own.

The proponents of the launch of the Armenian Nuclear Power Plant think this measure will somehow relieve the burden of an energetic crisis that hit the republic partly because of blockade by neighboring Azerbaijan.

### Armenia: Authorities Seek Russian Aid To Reopen Nuclear Power Station

LD1304222593 Moscow Radio Rossii Network  
in Russian 1600 GMT 13 Apr 93

[Text] Russia and Armenia are studying the possibility of demobilizing the Armenian nuclear power station which was closed down after the earthquake in Spitak in December 1988. Because of the shortage of electricity in the republic, the Armenian authorities have appealed to Russia's nuclear experts to let them have design documents to restart the Armenian nuclear power station.

**Armenia: Government Budgets 5 Billion Rubles for Nuclear Plant**

*OW1404162693 Moscow INTERFAX in English  
1545 GMT 14 Apr 93*

[Following item transmitted via KYODO]

[Text] The Armenian government has allocated 5 Bn. [billion] rubles from its reserve fund as initial spending to resume work at the country's moth-balled atomic power plant. Officials of the Atomtekhenergo company told Interfax that the company was now working over a programme and concept of commissioning the plant.

Energy and fuel ministry officials told Interfax that Armenia and Russia were now trying to flesh out an agreement on the resumption of work at the atomic power station. Plans were under way to strike deals with the Kurchatov Institute in Moscow and Atomteploenergo-proyekt and Gidrapress companies which will be responsible for project management, design and construction.

Energy and Fuel State Minister Sepukh Tashian told Interfax that the plant would be put into commission in 18 months' time. He said a set of priorities would be set for ministries and departments in the next thirty days followed by a thorough study of the station's state. Preparations for commissioning the plant are expected to start within three to six months from then Tashian said that as a party concerned, Russia might finance the re-commissioning of the plant, supply atomic fuel and take care of how to dispose of atomic waste.

The Armenian atomic power plant was shut down under public pressure in the aftermath of the 1988 earthquake, though undamaged. Although the authorities wanted to hold a referendum on its recommissioning, Armenian deputies authorised the government to decide on the facility's future under pressure from President Levon Ter-Petrosyan in March.

**Georgia: Tkvarcheli Coal Mines in Danger of Exploding**

*LD1404172193 Moscow ITAR-TASS in English  
1106 GMT 14 Apr 93*

[By ITAR-TASS correspondent Irina Schegoleva]

[Text] Sochi April 14 (TASS)—“The situation at mines of the Abkhazian mountainous town of Tkvarcheli becomes crucial. Methane has filled the main pits and is now moving towards nearby mines. A heavy explosion may occur underground and affect the operation of the Inguri cascade of hydro-electric power stations”, warns David Pilia, chief of the military garrison of Tkvarcheli and the Ochamchira district of Abkhazia.

The protocol of the negotiations between Russian and Georgian governmental delegations, signed in Sochi at the weekend, reads that the sides agreed “to take urgent and coordinated measures aimed at preventing a methane explosion at Tkvarcheli coal mines”.

These measures are of vital importance, Pilia stressed. Ventilation system is not functioning, since power supply has been cut off for the two months of energy blockade. If electricity supply is resumed, the gas may be pumped out within two to three weeks, the garrison chief told TASS.

The Inguri power plant cannot transmit electricity as transmission lines were damaged by fighting and bombardment. The town has no machinery, equipment or special teams needed to repair the damage, as this operation has always been carried out by specialists of the Georgian Energy Ministry, Pilia said. To set ventilation functioning, we need 18 tons of transformer oil, which is also a problem.

At present, only about 60,000 residents remain in Tkvarcheli, of which 7,000 are children under 16. They are exhausted, most having a low hemoglobin level. Strange as it may seem, birth rate is now quite high in the town that experiences a heavy shortage of baby-food, bread and other basic necessities. At the moment, it lives only thanks to farmers. Even greens are hardest to get, for February, a usual sowing season, was extremely cold this year, to say nothing of unceasing air raids.

“139 tons of humanitarian aid were delivered to Tkvarcheli in February, which can last town only a week”, Pilia reported. “Now we are looking forward to another batch of aid and also hope for assistance from Russia”.

**BALTIC STATES****Lithuania: German Minister Promises Support on Ignalina Reactor Safety**

*LD1504213693 Berlin ADN in German 1419 GMT  
15 Apr 93*

[Text] Vilnius (ADN)—German Environment Minister Klaus Toepfer has promised Lithuania German support in increasing reactor safety at the Ignalina nuclear power station. The Christian Democratic Union politician today visited the nuclear power station, which is considered unsafe by Western experts. Toepfer said Lithuania was dependent on the nuclear power station, as it supplied around 70 percent of the country's electricity. Two Chernobyl-type reactors are running at Ignalina with an output of 1,500 Megawatts each.

Following talks with Lithuanian Prime Minister Adolfas Slezevicius, Toepfer reaffirmed Germany's offer of help to correspondents in Vilnius.

Lithuania is the last stop on a trip lasting several days by the German environment minister through the three Baltic Republics. Earlier, Toepfer had promised Estonia and Latvia Germany's help in removing environmental damage at former Russian military bases. Among other things, director general of the Lithuanian Environment Department, Evalda Vebra, today told ADN Vilnius and Bonn intend to sign an agreement on cooperation in the field of environmental protection. He said so far 40 environmental experts from his country had been given training in Germany.

## REGIONAL AFFAIRS

### ESA Approves Polar Earth Orbiting Satellite *93WS0409E Paris ESA PRESS INFORMATION NOTE in English 26 Mar 93 pp 1-5*

[Text]

#### Earth Watch—The Next Step

There is growing worldwide concern over the potential of man's activities to damage the earth's environment. At the same time there is increasing realisation that our scientific understanding of the processes involved in creating the overall global environmental system is far from complete. This has led governments to support projects to monitor the global environment and to improve the confidence with which changes can be predicted.

Already ERS-1, the first European Remote Sensing Satellite, launched in 1991, is providing exciting new data, opening up new avenues of research and new approaches to critical problems. ERS-2 will ensure continuity, which is vital since a full understanding of the environment requires databases to be built over periods of more than a decade.

It is with this in mind that the governments of the ESA [European Space Agency] Member States wholeheartedly approved another ESA polar orbiting satellite, ENVISAT-1, to be launched in 1998. ENVISAT-1 will continue the mission of the ERS satellites with next-generation instruments and at the same time enhance its environmental component, most notably through a brand-new atmospheric sciences instrument package.

These ESA satellites can be seen as part of the response to the international earth and environmental sciences community, who are aiming at ambitious objectives through projects under the International Geosphere-Biosphere Programme (IGBP) and the World Climate Research Programme (WCRP). Fundamental to these programmes is the provision of global observation data to identify processes and validate models. Such data are also needed to monitor the state of the earth system and to detect changes. These requirements need long-term continuity, entailing the provision of a whole series of satellites rather than one-off endeavours.

These issues are all addressed in the earth observation programme undertaken by the European Space Agency, ESA. Coordinating fully with the other space-faring nations, ESA has chosen to play an important role in monitoring the earth/atmosphere system thanks to its ERS and ENVISAT series of satellites. Within this context the mission objectives of ENVISAT-1 include:

- continuity of ESA's current ERS-1/2 remote sensing projects in which the emphasis is on the observation of oceans and ice and their interaction with the atmosphere,
- new climate studies, including atmospheric chemistry.

#### Continuation and Extension of the ERS Missions

Here the most important variables to be observed are surface features, global wind and wave fields, ocean colour and sea surface temperature. Some of these are vital inputs to climate models. They will all be measured by ENVISAT-1, with its extended capabilities as compared to ERS. The key instruments covering continuation of ERS include:

1. The Advanced Synthetic Aperture Radar (ASAR), with dual polarisation, 400 km swath capability and a set of viewing angles,
2. The Medium-Resolution Imaging Spectrometer (MERIS), a 1,000 km swath imaging spectrometer (visible and infrared) used for ocean colour monitoring,
3. The Advanced Along-Track Scanning Radiometer (AATSR), a 500 km swath radiometer (in infrared and visible) for precise sea surface temperature measurements and observation of land characteristics,
4. The Advanced Radar Altimeter (RA-2), for determining wave heights and wind speeds globally. By also determining the variation of the distance between the satellite and the ocean surface the RA-2 will, in conjunction with an additional instrument devoted to precise orbit determination, give unique information on ocean circulation.

The unique opportunities for earth sciences, meteorology, oceanography and applications opened up by ERS will therefore be continued well into the next century. They also address biophysical characterisation of the oceans and coastal zones and additional information over land complementing data from optical and meteorological satellites.

#### Climate Studies and Atmospheric Chemistry

Atmospheric dynamics, coupled with the action of trace gases, are main drivers of climate. For studies of the trace gases, the limb and nadir viewing chemistry sensors on ENVISAT-1 will enable many of the key chemical species to be observed globally and with high precision, including ozone and the complete family of oxides of nitrogen. The key instruments for atmospheric chemistry are:

1. The Michelson Interferometer for Passive Atmospheric Sounding (MIPAS), a limb-sounding interferometer measuring the mid-infrared spectrum in the upper troposphere and the stratosphere.
2. The Global Ozone Monitoring by Occultation of Stars (GOMOS) instrument, a limb-viewing spectrometer observing ozone and other trace gases in the stratosphere, at high vertical resolution.
3. The Scanning Imaging Absorption Spectrometer for Atmospheric Chartography (SCIAMACHY), a limb- and nadir-viewing imaging spectrometer observing a wide range of trace gases.

## WEST EUROPE

JPRS-TEN-93-013  
14 May 1993

Together they form a unique combination to monitor and study the trace gas species involved in climate change, global warming and ozone depletion. Also of particular importance is the earth's radiation balance. Here, the data from SCARAB, a broad spectral band earth-radiation radiometer, will prove particularly useful.

### **ENVISAT En Route for a 1998 Launch**

ENVISAT-1 will be Europe's largest earth observation satellite, circling the earth in a sun-synchronous orbit around the poles, once every 100 minutes. Its special orbit allows it to view portions of the earth's surface at the same time every day.

ENVISAT-1 will be the first mission to use the ESA Polar Platform developed as part of the Columbus programme to be the workhorse on which Europe's future ambitious earth observation missions will be based. ESA awarded the prime contract for the development of ENVISAT-1 to British Aerospace, which has been involved in this programme since the mid-1980s.

To be put into orbit by an Ariane launcher in 1998, ENVISAT-1 is bound to become a key element of the worldwide effort to better understand and monitor the earth globally from space.

### **Europe Launches Geothermal Energy Research**

*93WS0388B Paris AFP SCIENCES in French  
11 Mar 93 p 30*

[Article: "European Geothermal Research Program"]

[Text] Soultz-sous-Forêts—A gigantic natural steam percolator connected to a turbine: Under a European research program, geothermal energy will have a go, on the Alsace plain, at demonstrating its industrial viability.

The principle is simple: At more than 3,000 meters underground, a granite platform traversed by numerous faults forms a giant radiator whose temperature reaches almost 200 degrees. Injecting water under pressure is sufficient to produce an outflow of steam that will drive a generator.

The Soultz-sous-Forêts (Bas-Rhin) experimental site is in the middle of old oil fields in Alsace that were exploited until the end of the 1960s. This region of the Rhine trough is characterized by a strong underground thermal potential on a line running from the foot of the Vosges to Worms in Germany. The production of electricity in this form would constitute a first in metropolitan France (one such power station already exists in Guadeloupe).

The production of electricity by means of solar or wind power can be reckoned in kilowatts; that is to say, on the scale of the needs of a few homes. The power that geothermal energy can release makes it an energy source of truly industrial proportions. "It is measurable on the scale of hundreds of kilowatts; that is, by units of measure

comparable to the classic power stations," says Mr. Alain Gerard, who is in charge of the Soultz-sous-Forêts project.

The production cost of geothermally-generated electricity remains slightly higher than that of the classic system. "But if the cost of amortizing the building a geothermal station is put on the same plane as the price of fuel of a power station, it quickly becomes evident that the geothermal solution is viable," says Mr. Gerard.

Around the beginning of the year, a boring was sunk, first through the sandstone then through the granite, to a depth of 3,590 meters. This was the first stage of the program that, in 1995, is to launch a pilot plant that will precede the construction of a 10-megawatt prototype around the end of the decade. For production on an industrial scale, the number of wells will have to be increased to yield a sufficient flow of steam.

"With about 50 wells, each 25 cm in diameter, some 100 megawatts can easily be produced," according to Mr. Gerard. As for the future: "Within a few tens of years, geothermally-generated electricity can be developed to rank as a serious alternative to nuclear energy," says Socomine's manager.

The cost of the research program will total around 35 million French francs [Fr], 55 percent of which will come from the EEC, 20 percent from French sources, and 15 percent from Germany. The remaining 10 percent is to be brought in by British institutions in the form of equipment (instruments, sensors, etc).

## DENMARK

### **Businessmen Offered 'Mysterious' Materials from Former USSR**

*BR1504142493 Copenhagen DET FRI AKTUELIT  
in Danish 14 Apr p 4*

[Report by Jens Grund: "Mysterious Substances From East"]

[Text] Last year the Riso National Laboratory had six or seven inquiries from people who had been offered so-called "red mercury" from the former Soviet Union.

According to Max Kristiansen, CEO and sales manager of Johnson Matthey, a company located in Bronshøj that deals in precious and base metals, a large number of Danish businessmen are being offered more or less mysterious raw materials from the collapsed Soviet bloc.

The businessmen in question turn to Johnson Matthey to find out whether there is a market for such substances and what their value is.

"There are all kinds of substances coming out of Russia. Some of them most probably are stolen. When the businessmen are offered these substances, they call us to find out whether we are interested," says Kristiansen.

Among the substances offered to these businessmen are raw materials like rubidium or cesium.

"We cannot imagine what cesium could be used for," says Max Kristiansen. "Danish commercial agents have asked us what the substances supposedly are used for. Our answer is: 'That is for you to say. After all, it is you who want to sell it.'"

According to Riso, a Danish wine merchant was offered cesium in return for wine. Another company was offered the same substance in payment for deep-frozen goods, say the police.

"The whole Soviet system has collapsed. As you can imagine, the people there are trying to sell anything of value," says Leif Sonderberg Petersen, Riso's information manager.

Riso has been approached by roughly 20 businessmen who have been offered one substance or another originating from the former Soviet Union.

Six or seven of these cases involved companies which had been offered so-called "red mercury." Apparently, on the international black market, this substance is reputed to be of use in the manufacture of nuclear weapons.

The businessmen want to know what the substance can be used for and what it is worth. "However, the powder is absolutely worthless," says Leif Sonderberg Petersen.

The raw materials osmium, originating from the Urals, and rubidium also have been analyzed by Riso at the request of a businessman who was offered the substances for sale.

"The substances in question can be cheap or expensive. It would seem that some people are trying to sell them without even attempting to find out what their clients actually need. These are not normal chemical transactions," according to B. Skytte Jensen, adviser at Riso's chemical department. As he puts it: "The fear is that we will become less vigilant and that as a result hazardous substances indeed will find their way into Denmark."

## FRANCE

### France Launches River Purification Program

93WS0313A Paris AFP SCIENCES in French  
11 Feb 93 p 36

[Text] Paris—The "Ile-de-France Clean Rivers" program will spend 10 billion French francs [Fr] over the next five years on water purification in the "Ile-de-France Clean Rivers." A financial partnership agreement to underwrite the program has been reached between the Seine-Normandy Water Agency, the Regional Council, and the eight administrative departments that make up Ile-de-France.

The Seine-Normandy Agency, which is the biggest of the six that exist in France, will contribute Fr6 billion, including two from the Regional Council. The five-year contract—which specialists described as "unprecedented"—was cosigned 8 February by Ile-de-France's prefect Christian Sautter, who is the president of the Seine-Normandy Water Agency's board of directors, and Regional Council President Michel Giraud.

The program will spend its Fr10 billion over five years to build "high-performance" purification stations (notably in Colombes, in Hauts-de-Seine) that can treat waste water "in keeping with European standards: Zero breakdown, zero nuisance (no smells or noise)."

The high-performance stations will cost nearly Fr2 billion to construct and will be able to treat "the pollution of a million Paris and Haut-de-Seine inhabitants." According to their promoters, the largely underground installations' technological qualities and compatibility with their surroundings will make them "the first of their category in the world." The plants will take up only 5 hectares of space, and will have gardens on the surface.

The joint policy to combat waterway pollution in the Paris region, decided upon by the Seine-Normandy Agency and the Ile-de-France Regional Council, aims to "totally eliminate the release of waste or surface water that has not been previously treated by a purification station into any river whatsoever." The state, the Seine-Normandy Water Agency, the Regional Council, and other partners including departments and water distributors are setting up an Ile-de-France Regional Clean River Observatory to monitor "the effect of the work called for by the contract." It held its general formation meeting 8 February.

### Rapeseed Diesel Fuel Sanctioned

93WS0313C Paris AFP SCIENCES in French  
18 Feb 93 p 20

[Text] Paris—"Green fuel" is getting off to a cautious start in France. The state and oil groups, Elf and Total, agreed on 11 February to support the use of rapeseed ester in diesel engines, a move that was recommended—with some reservations—by Raymond Levy in his report on biofuels that was made available to the press on the same day.

Agriculture and energy ministers Jean-Pierre Soisson and Andre Billardon signed an agreement with Elf, Total, and plant oil producers that calls for the production of 120,000 tons of rapeseed ester within three years. The ester is primarily earmarked for city buses, and will be made exclusively from rapeseed grown on land that has theoretically been laid fallow by Europe's new agricultural policy. For 120,000 metric tons of ester, that means 100,000 hectares. The state will pay farmers 25 million a year to make rapeseed cultivation profitable (800 to 1,000 French francs a hectare). It is purchasers,

and thus cities, that will have to pay the added cost (50 centimes a liter) of the gasoil-ester mixture, which contains 5 percent ester.

In the report Prime Minister Pierre Beregovoy asked him to make last fall, Renault's former CEO describes the value of biofuels as "exclusively agricultural." He cautiously recommends developing rapeseed ester. According to Mr. Levy, biofuels have no short-term energy or economic advantage and little influence on the environment.

### **Efficiency of Environmental Industry Analyzed**

*BR2704120393 Paris INDUSTRIES in French Mar 93 pp 6-9*

[Unsigned article: "Boom in 'Green' Industry: Banking on Innovation"]

[Text] With the world market for "green" industries booming, France has numerous assets which will allow it to benefit from the ecological trend. According to the Pecqueur report by the Economic and Social Council, over the next eight years France will consolidate its position as Europe's second ranking industrial nation with sales of around 90 billion French francs [Fr]. The government is paying extremely close attention to these major economic interests and is seeking to raise its technological level in various sectors, especially in waste processing.

Gone are the days when companies viewed standards as nothing more than a constraint imposed by the public authorities. Today the ideal of environmental protection has given rise to an entire range of industrial activity. In 1991 the "green" industries—namely those companies producing or supplying services for measuring, preventing, limiting, or correcting damage to the environment—had sales worth more than Fr86 billion in France.

### **Players of Sufficient Size**

France's main "green" industry strength is water purification. In 1991 this market accounted for more than Fr41 billion, a figure close to half the entire French budget for the environment! And the two main corporations, the General Water Company (CGE) and the Lyonnaise des Eaux-Dumez [Lyon Water Company-Dumez], are world leaders. Their research budgets far exceed those of their rivals. As for drinking water, the CGE has set itself a challenging goal: to eliminate organic matter, micropollutants, and chlorine using a procedure that combines the use of filtering membranes (a process called nanofiltration) and ozone-based purification. For the first time ever in the world, filtered river water will be drinkable without any addition of chlorine. A pilot station is currently being tested near Auvers-sur-Oise. The Lyonnaise des Eaux, meanwhile, has developed its own membranes for use in aqua-shock equipment. These filters enable a site to be supplied with drinking water taken from rivers. The company is also working on general network management. But these two giants in the

field are concentrating mainly on developing their purification activities in order to further the growth of their subsidiaries, namely Degremont for the Lyonnaise and OTV [expansion not given] for the CGE. Both concerns should benefit in this sector from the implementation of European directives adopted in 1991 and from the French Water Act of 3 January 1992, which rendered the processing of rain water obligatory. So, priority is being given to high-technology purification plants which differ from their predecessors in terms of their capacity and very low nuisance [nuisances] level.

French industry is not only prominent in the water sector, but is also recognized for its competence in waste processing. In companies like CGE, the Lyonnaise des Eaux-Dumez, Saur, and EMC Services, France has players of sufficient size to face up to international competition. Admittedly, household waste recycling should be rationalized and made more professional, but the performance of the country in this respect is within the European average. Nevertheless, the reprocessing of industrial residues remains a delicate issue. Under current legislation, by 2002 category-1 garbage dumps (dealing with toxic products) will only accept final waste which has been reduced to the smallest possible volume and neutralized. However, although French technical research into the various neutralization technologies is relatively advanced, the industrial groups still need support to meet their future obligations. Since France took over the presidency of EUREKA [innovative technologies program], it has launched a major research program (see box) aimed at encouraging research into waste processing. The Lyonnaise des Eaux-Dumez and Rhone-Poulenc are strengthening their cooperation to develop incineration processes for industrial sludge originating in part from the chemical industry. EDF [French Electricity Company] and its Turu subsidiary have looked into the possibility of plasma torch incineration (neutralization using an electric arc), and the boiler-maker Stein, a subsidiary of GEC-Alsthom, has developed a vitrification process which detoxifies industrial and hospital waste. In all, something like 10 new projects will be given official EUREKA status at the next ministerial conference in Paris in June.

Although technically competent in the waste sector, French companies lag behind in the "green" air-processing industry. Having made a slow start, they have to play the innovation card to win a market share. The reason for this is French legislation on air pollution, which, for many years, was limited to eliminating industrial dust. The result is outdated equipment (five times worse than that used in the German Laender formerly belonging to the German Democratic Republic), which is affecting national industries today. However, many companies have successfully proven their competence in specific niches. Lab, for instance, a Lyon-based company which has developed a wet gas scrubbing and dedusting system used by waste incineration centers. This company has become France's largest exporter of air-processing equipment and recently equipped the incineration unit in Amsterdam West. In the steel sector, the

Neu plants in Marcq-en-Baroeul have distinguished themselves with the anti-pollutant equipment for Dunkirk's reactor 4 and the earthy alloy furnaces in Spremberg, Germany. Mention should also be made of Procedair, the dry gas purification specialists (using fluoride and hydrochloric acid) and Speic, Sarp Industries, Onyx, and the Compagnie Generale de la Chauffe [General Heating Company], which are developing dechlorination procedures.

#### Limited Range of Equipment

In order to retain its second position in Europe in the environmental sector, France will also have to expand the range of equipment it manufactures. In this respect, the limited range of French goods is worrying, as the Pecqueur report rightly emphasized, and its conclusions were repeated by the Environmental Committee of the XIth Plan. In the production of collecting equipment, garbage sorting machines, furnaces, or sensors, the European market is dominated by non-French groups including large numbers of German companies, whose patents equip incinerators in particular. The Industry and Foreign Trade Ministry has just commissioned a report on this subject from Philippe Brogniart, president of the FNADE (National Federation of Waste and Environmental Industries). He would also like to strengthen independent engineering services because, although the services of the Construction and Public Works and Environment Ministries satisfactorily meet general demand, it appears that international finance organizations now prefer independent consultancies, which are considered better able to organize competition between manufacturers. A study by SRI for the Ministry of Industry showed that the strength of German production lay in its greater concentration on process engineering and in its specialist companies. Degremont has fully realized this, hence its involvement of the Safegé company earlier in the production process.

Technology dissemination is another favorite access route to the marketplace. The technical centers (CTI's), which are responsible for promoting technology dissemination and transfer, have been investing in the environment for several years. Five of the 11 dossiers qualifying for support in 1992 were in this field. The technical paper center, for instance, has invested in bleaching (work on chlorine-free processes), paper recycling, water effluents, and residual pulp (balance sheets and factory audits, definitions, analyzing traces of chlorinated components). However, such examples remain too few and far between. Many companies prefer to keep their anti-pollution methods secret out of fear of being copied. Overall, French engineering does not play a sufficiently large role in technology transfer.

#### Key Role of Technology

Nevertheless, the importance for companies working in this market to adapt to technological solutions is clearly demonstrated in a study completed by SESSI [Research

Service for Industrial Strategies and Statistics]. "Continual monitoring and innovation are crucial for launching products and services in a burgeoning market, largely ruled by legislation. Close to 60 percent of "green" industries say they have launched new products, with small companies being scarcely less active than big ones," points out Myriam Julia and Michele Falco. Even more astonishing is the fact that half of all "green" companies affirm that they are engaged in research and development.

The availability of leading-edge technology serving the largest possible market will be a major strength. This is the final conclusion reached by all the players involved: companies, local authorities, and public services. Technological leadership is a decisive factor in competitiveness and provides some influence over the adoption of European standards. It is therefore very clearly a market-creating element.

#### Well-Placed to Influence Water Legislation

In this field the least hesitation can have expensive consequences. This is how France let the catalytic converter market get away, to the disadvantage of the clean engine defended by its own car manufacturers. By contrast, French industrialists skillfully negotiated the race for CFC substitutes and today are well placed to stamp their mark on water legislation. The advanced technology of the purification plants developed by French industrial companies raises the level of European standards. Giant French "green" companies could also influence both hot (vitrification) and cold neutralization processes. The latter technology is supported by the CGE and the Lyonnaise des Eaux and uses hydraulic coagulants and additives that react with water to trap and mix liquid and muddy waste. At present, the technology is well ahead of the competition, a significant advantage from the point of view of new waste legislation!

The availability of advanced technology satisfying the largest possible market will be a significant advantage, because all environmental sectors, whether large or small, will be the subject of a fierce struggle throughout the world. The key element is mastering the market of ecological products which respect the environment "from the cradle to the grave." This is a struggle which requires a serious ability to anticipate opportunities and seize on them whenever they arise.

[Box, p 7]

#### EUREKA

EUREKA is convinced of the potential of European waste management. The European cooperative program, presided over by France until June, is emphasizing environmental aspects, particularly waste research. Every year EUREKA labels and financial support are granted to innovative industrial projects originating from at least two different countries. The objective is to produce a commercial product, process, or service. More than 600 projects have been funded in this way, and 455

French companies have participated in the program. Until recently, industrialists seemed somehow to be shunning the waste market. By now, several research and development programs uniting French waste groups with European partners have already gained EUREKA's support. Examples include the following:

### INTEC

Piloted by the General Water Company [CGE], this ambitious program worth Fr475 million aims to develop the full range of technical tools necessary for a total waste management service. The solution for each material depends on the local context. "In medium-sized towns in rural regions, the sludge from purification stations is recycled easily as fertilizer, but wanting to see compost in Parisian garbage cans seems aberrant to me," explains Michel Dutang, waste manager at CGE. For that reason, the program covers a vast technological range: 35 subprograms covering collecting, sorting, recycling, thermal processing of normal waste, specific processing, neutralization, process residue storage, and

finally factory management and optimization. Adopted by EUREKA in 1992, INTEC comprises 13 partners including six non-French companies.

### SITINERT

Led by SITA, a subsidiary of the Lyonnaise des Eaux-Dumez group, the SITINERT program seeks to develop new stabilization and solidification processes for the final residues of special industrial wastes. It is also planning to design a new final residue storage system. Its budget totals Fr90 million. Flying the EUREKA flag since 1992, SITINERT comprises nine partners, three of them being non-French.

### [Box, p 8]

#### Ministry of Industry Invests in Research

Since 1989 major investments have been made in environmental research and development. Growing continually, these investments already exceed Fr300 million.

The main areas selected to receive funding are as follows (1992):

Areas	Total Amount (MFr)	Subsidy (MFr)	Subsidy Percentage
Clean, energy-efficient automobiles	218.80	85.90	27.76%
Electric automobiles	161.00	40.30	13.02%
Automobile frames	130.80	33.95	10.97%
Other clean products	97.60	39.30	12.70%
Clean technologies	70.00	22.90	7.40%
Water	247.10	51.80	16.74%
Waste	108.80	35.30	11.41%
<b>TOTAL</b>	<b>1,034.10</b>	<b>309.45</b>	<b>100.00%</b>

Waste is the latest addition to the list; this topic has also been adopted as priority program under EUREKA.

Note the large share of automobile-related sectors in the environmental field: the "clean, energy-efficient automobiles," "electric automobiles," and "automobile frames"—areas worth a total of Fr160 million alone, i.e., 52 percent of all environmental aid awarded by the ministry.

Mention should also be made of the significant activity of the industrial technical centers.

### France Launches Phebus Nuclear Reactor Research Program

93WS0325A Paris AFP SCIENCES in French 4 Mar 93  
p 29

[Unattributed article: "Phebus Reactor To Go Back on Line for Testing After Three-Year Shutdown"]

[Text] Paris—After a three-year shutdown, the Phebus nuclear research reactor, located at Cadarache (Bouches-du-Rhone Department), has just diverged in preparation

for three months of testing, the Nuclear Protection and Safety Institute (IPSN) announced in a 2 March press release.

According to the press release, IPSN will be using the facility through 1998 for a research program, Phebus PF [Fission Products], on the behavior of fission products in a nuclear reactor in the event of a serious accident.

The program has required major changes in Phebus, as well as the construction of an experimental pressurized-water reactor. Following on the first hot tests of the experimental loops, completed in recent weeks, this first divergence "constitutes an important step in the startup test campaign, which should end with the first experiment before summer," IPSN says. Thereafter, the Phebus PF program will proceed at the pace of one experiment a year.

IPSN has received considerable cofinancing to carry out this project, which has an expected total budget of 900 million francs: EDF [French Power Company] (25 percent of costs), the Commission of the European Communities (30 percent), and 15 percent from several foreign participants (Japan, the United States, South Korea, and Canada).

## GERMANY

### German Ministry Funds Aviation Pollution Research Program

93M10418 Bonn *TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN* in German  
19 Feb 93 pp 5, 6

[Text] The BMFT [Federal Ministry of Research and Technology] is funding a joint Aviation Pollution program. On the one hand, scientific atmospheric research studies are set to improve our knowledge of the effects of aircraft emissions into the atmosphere and, on the other, studies of engine technology are to create the conditions for reducing pollution from air traffic.

The BMFT is funding over 20 projects under the Atmospheric Research subprogram. A total of approximately 12 million German marks [DM] has been authorized for three years. In addition, the partners from industry, the major research institutes, the Max Planck and Fraunhofer societies, the universities, and other institutions are providing their own resources to an approximately equal level. The German Aerospace Research Institute (DLR) is coordinating the scientific work and the program.

Work under the Engine Technologies subprogram was initiated by the funding of five basic research-oriented projects on combustion chamber technology to the tune of around DM3.1 million under the BMFT Aviation Research Program.

The Atmospheric Research subprogram determines pollution emissions, the propagation of the pollutants, and their effects. By about 1995, it will be possible to assess the risk potential from air traffic much more reliably than is the case today. It will mean setting up databases in which the emissions from individual engines in all operating states and the movement sequences of global aviation are recorded and linked together. The chemical processes in the air are complex and varied. The dominant processes and interactions during pollution discharge and transportation have to be identified and described in their orders of magnitude against the background of natural emissions and concentrations. Atmospheric computer models must be extended and refined with respect to current formulations (includes three-dimensional instead of two-dimensional, and reduction of the currently still very rough grid widths). Measurements must be made at relevant flight altitudes, to verify and further develop the computation processes so that recording of the propagation of pollutants can approximate more closely to reality, and their effects on the earth's radiation management can be quantified.

Air transportation is also being included in discussion of the greenhouse effect and the hole in the ozone layer.

The current fuel consumption of the world's civil air traffic is estimated at approximately 180 million tonnes. During operation, an aircraft engine produces the known greenhouse gases carbon dioxide ( $\text{CO}_2$ ) and water vapor

( $\text{H}_2\text{O}$ ), and a series of other pollutants such as nitric oxide ( $\text{NO}_x$ ), carbon monoxide (CO), unburned hydrocarbons ( $\text{CH}_x$ ), smoke, and other trace elements (sulfur dioxide, additives).

Since the introduction of jet engines in the sixties, the specific fuel consumption of modern engines has been almost halved, together with a corresponding reduction in carbon dioxide and water vapor emissions, and other pollutant emissions have also declined in proportion to nominal thrust. Nitric oxide emissions have, however, remained constant, owing to the trend towards higher temperatures and pressures to enhance efficiency. Since air transportation is increasing at a disproportionate rate (transport capacity rose from 920 billion passenger kilometers (pkm) in 1978 to 1,900 billion pkm in 1990, and is set to double again by 2005), the absolute pollution emissions are also increasing.

Although air transportation, both civil and military, has a share of less than 2 percent in overall energy consumption worldwide, travel at high altitudes is expanding. In the upper troposphere and lower stratosphere, air traffic is the only direct emitter of anthropogenic pollutants, i.e., those caused by mankind. Unlike pollutants emitted close to the earth, which are washed away by rain, emissions introduced at high altitudes have very long dwell times. This particularly applies to water vapor and nitric oxides. Compared with the low natural water vapor concentration, the water vapor emanating from aircraft is a considerable form of pollution, which is frequently also visible in the form of vapor trails, and can rise to the ice clouds that intensify the greenhouse effect. Nitric oxides, on the other hand, affect the ozone content of the atmosphere. Whereas they raise the ozone content in the troposphere, they contribute to ozone depletion in the stratosphere.

At our current level of knowledge, it is not clear whether we can accept engine emissions when considering climatic effects, or whether remedial measures will be necessary. All this is against the background of both the forecast growth in world air transport and improvements stemming from the possible introduction of supersonic flight, which is under discussion especially in the United States. The BMFT's joint Aviation Pollution program is intended to make an essential contribution, both in improving our knowledge and as a basis for possible action.

Further information is available from Herr Schmidt, Environment Research Project Manager, DLR, Sudstrasse 125, D-W-5300 Bonn, Germany, tel. 0228/3821-224.

### BMFT Funds Environment-Friendly Pulp Production Process

BR0405093293 Bonn *BMFT JOURNAL* in German  
Mar 93 p 14

[Text] The first production facility in the world operating the organocellular method of pulp production has

gone on line in Kelheim (Bavaria). Development of the environment-friendly, pioneering process has been funded to the tune of 18 million German marks [DM] by the BMFT [Federal Ministry of Research and Technology] over a period of 10 years. Its conversion into a large-scale industrial plant with an annual capacity of 150,000 tonnes is being funded solely by Bavarian Pulp GmbH, which is investing DM520 million, thereby creating 250 skilled jobs. The BMFT funding has therefore achieved its objective in all respects.

The main feature of the organocellular development is that it uses no sulfur at all. The pulp produced by this method has strength properties far in excess of those produced by the sulfite and sulfate processes that are prevalent worldwide. Because sulfur is not used, lignin and hemicellulose, the other two main components of wood, which is a renewable raw material, can be further processed.

#### **Reactions to Chemical Disaster Caused By Hoechst**

##### **Environment Minister's Position**

**93MI0399A Munich SUEDDEUTSCHE ZEITUNG**  
*in German 2 Mar 93 p 1*

[Text] Following last week's accident, Federal Environment Minister Klaus Toepfer (CDU [Christian Democratic Union]) has described the information policy of chemical company Hoechst AG as "unsatisfactory." Toepfer stated on Monday that he plans to ensure that the case is investigated with appropriate documentation, by the Accident Commission. The so-called "waste substances" inquiries also needed to be speeded up, he stated. Ortho-nitroanisol, the substance discovered at Hoechst, had previously been investigated, and the results had been available to Hoechst. "We were surprised that this information was not made public," Toepfer added.

##### **Major Contamination Avoided**

**93MI0399B Munich SUEDDEUTSCHE ZEITUNG**  
*in German 2 Mar 93 p 2*

[Text] A week after the severe chemical accident at Hoechst's factory in the Frankfurt district of Griesheim, clean-up operations are well in hand, according to the Fire Department. Reinhard Ries, head of the Frankfurt Fire Department, stated that he believed that the worst contamination had now been removed. Hoechst AG stated that 4.5 percent of the substances which escaped a week ago had still not been identified. Toxicologists have been advising Hesse's Environment Ministry in Wiesbaden on the consequences of the accident, the results of which remain as yet unknown.

Ries stated that decontamination of roofs in the contaminated district of Schwanheim would continue, and that the fire department had issued an all-clear over air pollution, which meant that air pollution by chemicals

was below the detectable level. A total of 400 cubic meters of soil, shrubs and bushes have been removed, and removal of the bank of the River Main at Schwanheim will soon be completed. The roughly 200-strong company fire department at Hoechst have now started removal of the asphalt surfaces of badly contaminated roads.

A Hoechst spokesman stated that all but 4.5 percent of the substances released in the poisonous cloud had now been analyzed; he added that the accident-stricken plant, built in 1952, was not equipped with an acoustic alarm, and the most recent approval by the health and safety authorities had been granted "at the end of the eighties." The Environment Ministry had called on the company to implement safety measures which "could take immediate effect" at similar plants. At the weekend, Hoechst confirmed that it had information about the carcinogenic effects of ortho-nitroanisol in November 1992.

In Wiesbaden, Environment Minister Joschka Fischer of the Green Party called a meeting of leading toxicologists and representatives of the Federal Environment Agency, the Federal Health Agency, the Federal Agency for Industrial Health and Safety, the Federal Environment Ministry and other bodies. According to the ministry, the toxic and ecological properties ortho-nitroanisol and the other substances released were discussed.

#### **German Technology Used in Building Large Coal Power Plant in South Africa**

**93MI0444 Bonn DIE WELT** *in German 4 Mar 93 p 14*

[Article by Juergen H. Wintermann: "Light for the Cape of Good Hope—4,000-Megawatt Coal-Fired Power Station Built in South Africa With German Technology"]

[Excerpt] [Passage omitted] In power generation in particular, Germany has something to offer South Africa in its pursuit of progress: the best in coal technology with the world-record efficiency for conversion into electricity. And all at competitive prices. On the Cape of Good Hope, German firms are fighting the entire international competition for orders.

At the end of 1983, the Ratigen-based firm Balcke-Duerr AG (BDAG), in conjunction with DB-Thermal Pty., Johannesburg, part of the Deutsche Babcock group, pulled off a particularly big deal. It landed the 850 million German mark [DM] order to build the six dry cooling towers for the 4,000-megawatt Kendal coal-fired power station in Transvaal.

It was clear to the customer, the Electricity Supply Commission (Escom) that water—and thus cooling water—is in short supply in the region's coalfields. Wet cooling towers, which work by evaporation, were therefore out of the question. Forecasts of future water and coal consumption at Kendal showed that the water reserves would be exhausted long before the coal reserves.

The dry cooling tower, where not a drop escapes into the atmosphere, saves 130 megaliters a day, equivalent to the daily needs of a town with a population of 120,000, or, with six towers, a 2.5 million-strong city. The considerable additional investment will pay for itself in the medium term. Escom was won over by the Balcke-Duerr technology. The power station has already commissioned three of the six electricity generators. The last cooling tower will be completed in the next few weeks. Then it will be working at full load. The turbines were supplied by Siemens-KWU [Power Engineering Division]. With its six gigantic towers, each of which would hold Cologne Cathedral, Kendal is the largest plant in the world in the history of cooling technology. The cooling pipes are 420,000 km long, 1.4 times the distance between the earth and the moon.

South Africa will need new power stations by the next century at the latest. But already old plants are being retrofitted, with flue gas filter units as well. With Kendal as a reference, Babcock and Balcke-Duerr have a good chance of building them.

#### **German Architect Builds Sun-Tracking Solar-Powered House**

93MI0433 Munich SUEDDEUTSCHE ZEITUNG  
in German 11 Mar 93 p 33

[Text] Architect Theddo Terhorst has built a house that turns towards the sun like a flower in Rheine near Muenster. As soon as the sun is higher again in northern Europe, the rotation system will pay, Terhorst believes, as the movement of the pyramid-shaped house about its own axis will enable the 12 square meters of roof-mounted solar cells to generate about twice as much electricity as the photovoltaic systems installed in stationary houses: He expects a power output of about 1,500 W/h in good weather. The house turns imperceptibly, at the rate of five centimeters a minute. The electric motor that rotates the 180-tonne building uses only approximately 1 percent of the self-generated power, costing only five pfennigs a day to run, says Terhorst. This modest consumption is achieved by a sophisticated gear system with a high conversion rate of 1:13,636 that transfers the rotation of the motor to a "turntable" whose tracks rest on rollers let into the foundations: the same technique used to move locomotives in marshaling yards. The house has a floor area of 153 square meters and costs in the region of 550,000 German marks.

#### **German Institute Develops Optical Exhaust Gas Analyzer**

93MI0432 Munich SUEDDEUTSCHE ZEITUNG  
in German 11 Mar 93 p 33

[Text] Physicists in Freiburg have developed an optical process capable of determining the composition of car exhaust fumes, even during starting and changing gear. Previously, measurements of this type had only been possible at constant engine speeds. The Fraunhofer

Society has announced that Maurus Tacke and his colleagues at the Fraunhofer Institute of Physical Metrology use a semiconductor laser that measures the exhaust fume components in a matter of milliseconds. The researchers exploit the fact that gases absorb light of characteristic wavelengths. For example, if the new method reveals rapidly fluctuating gas concentrations, they can look at the combustion process in the individual cylinders. Information of this type is of considerable importance to designers of fuel-saving, environment-friendly engines. By installing measuring probes at both ends of a catalytic converter, the Freiburg team can find out directly to what extent the converter reduces polluting gases such as nitric oxide or carbon monoxide. However, the researchers say that the sophisticated technology makes the process too expensive for routine measurements.

#### **Siemens-Nixdorf Builds Environmentally-Friendly Modular Components**

93WS0365A Duesseldorf VDI NACHRICHTEN  
in German 12 Mar 93 p 20

[Article: "Environmental Protection Integrated into Manufacturing Saves Production and Disposal Costs"]  
[Text] VDI-N, Paderborn, 12 March 1993, Si—A fixed component of product development at Siemens Nixdorf Information Systems AG [SNI] is the experimental values and guidelines being worked out with the involvement of the new recycling center. Plant manager Peter Feldweg already sees in this the charting of a course whereby it will be possible to have environmentally-friendly manufacturing and recycling at the end of the product's "life cycle."

This is why already in the definition and development stage Paderborn designers select all plastics that are used on the basis of ecological criteria. "Non-recyclable or hardly recyclable materials, such as duroplasts, for instance, are not incorporated into SNI products," says Feldweg. Additionally, all modular-built SNI system components are plug-in. Not only does that save on connecting cables, it also guarantees easy separability in later recycling processes.

Feldweg cites the switch from spraying to dusting of metal parts as a striking example of the use of environmental protection integrated into product manufacturing. Using the conventional method, more than 100 t of lacquer sludge had to be cost-intensively disposed of. Dusting has succeeded in virtually entirely avoiding that problem substance. With practically 100 percent use of dusting material, less than one ton now requires disposal.

Paralleling this sizable reduction was the success in perceptibly lowering the volume of air required for the coating process, thereby also saving large amounts on energy. Since powdered lacquer is now electrostatically applied to the metal parts and the lacquer coating is then accomplished only through heating, the atmosphere is no

longer charged with environmental pollutants. According to Feldweg, it is presently possible largely to dispense with the nearly 100,000 m<sup>3</sup>/h of fresh air in the spraying compartments that was preheated to 20°C. The plant manager estimates total fresh air savings in the lacquer sector at 50 percent. The processing changeover also significantly reduced the volume of effluents since dusting renders water-flushed spraying compartments superfluous.

### **German-Built Environmental Observation Satellite "Temisat" Described**

*93WS0365C Duesseldorf VDI NACHRICHTEN in German 12 Mar 93 p 27*

[Article: "Space Lookouts Monitor Environmental Events"]

[Text] VDI-N, Munich, 12 March 1993, E.S.—Telespazio, with headquarters in Rome, is the customer's name. A rocket enterprise in Moscow is handling the powerful thrust heavenward. The Munich firm of Kayser-Threde is building the "Temisat" compact environmental observation satellite that is supposed to be sent up along with a Russian weather observation satellite named Meteor-2.

The tiny "Temisat" satellite is "in contrast to experimental precursors, the very first commercial and professional microsatellite system for the recording and transmission of environmental data," declares Niko Balteas, Ph.D. (Engineering), program manager for satellite, communication and navigation systems at the Munich space specialists Kayser-Threde with its rich traditions. This coming July it is supposed to soar heavenward from the Russian launchsite at Plesetsk piggybacking on the Meteor-2 and then, using a Cyclone rocket, "be placed into a low polar orbit, that is, crossing over both poles," and then in September begin its task. That is, incidentally, the time when Kayser-Threde already plans to see off a second microsatellite—in fact, a Berlin Technological Institute [TU] "Tubsat" research satellite—along with a Meteor-3. It is said that the Munich firm in this case, incidentally, is supposed to assume "responsibility for the Tubsat payload and launch" as well as its additional loadings.

The cube-shaped Temisat, weighing only 30 kg and with a length of 350 mm along its edges, will collect and forward environmental data originating from single and autonomous measuring stations. In doing so, for the first time now an automatically operating data network based on an inexpensive satellite system is supposed to function with the use of a very powerful technology that specialists know as time division multiplex access [TDMA]/SCPC and thereby "one of today's most innovative and effective communication technologies is being put in the service of environmental protection," as Balteas proudly emphasizes.

Balteas declares, "modern technology's highly developed, high-speed electronic components currently

permit very rapid and flexible development of individual communication networks and radio links." Above all, the system functions with very high throughput and a high degree of data security through the use of regeneratively operating channels that boost the data both in orbit as well as on the ground.

In the extremely hurried development of the microsatellite, for which only one year was allowed, from the signing of the contract to launching, "we have come up with a wholly redundant design and as far as possible we have used components that are proven and space-certified," says Balteas. The work has been done by a small project team virtually without subcontractors, "as much as possible resorting to off-the-shelf standard parts and software modules. Moreover, we have avoided as much as possible developing anything from scratch."

Specifically, the operation of the total data communication system is supposed to proceed so that, whenever the satellite is just "visible," the system control center [OCC] sends it special remote control [TC] and polling data signals via its remote control channel. Once the satellite has received those it forwards them to the various data collection centers [DCC] and user terminals [UT] on the ground, while itself otherwise commences beaming data containing information on its present orbital position and other systems data.

During each overflight every 104 minutes, the satellite, circling at an altitude of 950,000 m, simultaneously assembles the data from a maximum of eight each data collection and user stations previously flagged for it by the system control center. It processes and multiplexes them and then immediately retransmits them down to earth while simultaneously storing them in mass storage for later polling. This enables all system control centers and data collection stations equally within each "field of vision" to receive the data beamed down by the satellite. Balteas states, "this ensures a continuous flow of data between the satellite and the ground units."

In a total system context, the system control center controls the operations of the satellite itself as well as access to its channels. Each of the data collection stations is responsible for a specified group of user stations that they too in turn can remotely control via the satellite.

Balteas's company competed the Temisat for the Telespazio contract even "driving off the field a strong competitor, the U.S. Interferometrics company," as Balteas proudly points out. The Temisat is passively stabilized via a magnetic field. On standby it consumes two watts and at its maximum, 60 watts of energy and offers a maximum of 64 each analog and digital channels just for registering and monitoring its own internal system status.

In addition, 10 receive-channels and three transmit-channels are available for actual effective operation with three more, initially inactive, reserve send-channels standing by. Depending on the operational status and the type of data, the latter are transmitted at 1200 to 4800

bauds. Hence as a result of multiplexing, the data transmit-rate is four times as great as the receive rate.

A multiprocessor system based on four transputer chips handles internal control of the satellite, which is designed with full redundancy and also possesses a host of additional single-chip microcomputers. The result is a second unused system ready on standby to jump in any time there is a failure and thereby safeguard the investment in the satellite.

The total order for the Temisat system is valued at approximately \$10 million for the two satellites, the one system control center, the 50 data collection stations and the 1000 user stations that are presently supposed to be manufactured and delivered by Kayser-Threde.

### Prospects for Environmental Engineering Reviewed

93MI0440 Bonn DIE WELT in German 12 Mar 93 p 14

[Article by Ute Semkat: "Booming Market for Environmental Technology"]

[Text] The site of the "Terratec" environmental trade fair is a mass of green, with 641 companies from 17 countries presenting their latest environmental technology. Almost one in every two German exhibitors is based in the new laender.

The market for environmental technology is booming, with around 280 billion German marks [DM] needing to be invested in eastern Germany over the next 10 years in water treatment, garbage dump construction, reclamation of contaminated sites and energy supply. In western Germany, DM380 billion will in the future be invested in creating an environment-friendly infrastructure.

Besides prestigious major companies, many medium-sized firms are also represented. Established firms are skeptical, however, about the rush into this apparently unlimited future market, primarily because these entirely publicly-financed contracts are proving slower to materialize than expected. The reason for this delay, apart from "administrative dilemma," is stated to be the local councils' fear of funding evaporating, together with the new laenders' imminent local governmental reform.

East German companies active in areas ranging from engineering to chemicals discovered the environment in 1990, seeing it as a new area offering scope to compensate for the collapse of their traditional core industries. Sket AG of Magdeburg has expanded its modest recycling business beyond road construction into abandoned automobiles, garbage, and sewage sludge. Similarly, the former research department of DDR [GDR: German Democratic Republic] Agricultural Machinery, now known as Agritechnik, based in Neustadt, Saxony, is using its experience of process technology and its home advantage in selling compact environmental clarification plants.

Those just entering the market are regarded with some suspicion by established firms such as Thuringian Environment Technology GmbH of Sonnenberg, whose 40 employees generated around DM40 million of revenue in 1992. Financial Manager Dieter Bauer feels the market suffers from "distorted relationships." He points out that "for more than 20 years, around 50 firms supplied west German homes with drains and sewerage equipment—whereas up to 100 are now bidding to supply the new laenders' 16 million inhabitants."

### Eco-Fridge Goes Into Mass Production

93MI0451 Munich SUEDDEUTSCHE ZEITUNG  
in German 15 Mar 93 p 23

[Text] The world's first refrigerator without ozone destroying CFHCs [chlorofluorohydrocarbons] and the greenhouse gas CFC [chlorofluorocarbon] goes into mass production on Monday at Foron Household Appliances GmbH in Niederschmiedeberg, Saxony. The factory, which was under sentence of death six months ago, when it was called dkk Scharfenstein, and was to be liquidated by the Trust Agency after prospective purchaser Bosch-Siemens withdrew, has made a breakthrough in environment-friendly refrigeration technology and in so doing given itself a good chance of survival.

The industry's giants in western Germany have for several years been banking on the refrigerant R 134, which has no chlorofluorohydrocarbons but which, because of its chlorofluorocarbon content, contributes to atmospheric warming, otherwise known as the greenhouse effect. They also reacted negatively when, in 1990, two doctors from the Dortmund Hygiene Institute presented an environmentally harmless mixture of propane and butane as an alternative refrigerant.

### With Help From Greenpeace

The environment protection organization Greenpeace supported the idea and searched a long time for a firm willing to test the environment-friendly refrigerant, until it hit upon the Trust Agency firm dkk Scharfenstein from Saxony. The Saxon firm, whose sales had slumped since the unification of Germany from a million refrigerators and freezers a year to 178,000 in 1992, accepted Greenpeace's proposal in April 1992.

Within a very short space of time, the dkk engineers developed an appliance with the new refrigerant. When news came from the Trust Agency in mid-July that potential investor Bosch-Siemens had withdrawn and dkk would subsequently be liquidated, the firm took the bull by the horns with the environmentalists' support. They presented the prototype "greenfreeze," as Greenpeace calls the new type of refrigerant, to the press at a press conference a few days later. Shortly afterwards, the environmental organization started a full-scale advertising campaign that brought about 70,000 advance orders. In August, a large mail order firm announced it had ordered 20,000 of the new fridges from Scharfenstein with an option on another 50,000. In 1993 Foron

intends to build around 270,000 eco-fridges in 11 different models. If it manages to increase production to 300,000 in 1994, the firm will be in the black. The new fridge will cost around 600 German marks [DM] in the shops.

The Trust Agency gave way, too. In August it announced that it would maintain refrigerator production in the Erz Mountains and contribute DM5 million to develop the eco-fridge to the production stage. Then, in November, a buyer was found for what had been the former GDR's only refrigerator manufacturer. The East German Investment Trust, London, a Berliner Bank consortium, and the company management, now trading under the name of Foron Household Appliances GmbH, are the new owners of this firm, which is fighting against all odds for survival.

West German manufacturers stuck to the view that using propane and butane was technically impossible. In November, the dkk engineers announced that, after many improvements, the propane/butane appliances now consumed 10 percent less power than fridges cooled with CFHCs. Other manufacturers have now also jumped on the eco-fridge bandwagon. At the Domotecnica household appliances fair in Cologne in February, competitors Bosch-Siemens and Liebherr for the first time exhibited appliances with the propane-butane mixture as refrigerant.

#### Toepfer Comments on Possibilities of Nuclear Waste Disposal

AU1604145893 Hamburg DIE WOCHE in German  
15 Apr 93 p 33

[Interview with Environment Minister Klaus Toepfer by an unidentified DIE WOCHE journalist; place and date not given: "Off to the Final Storage Site?"]

[Text] (DIE WOCHE) Soon the first batch of highly radioactive nuclear waste will return from La Hague. What will happen to it?

[Toepfer] The agreements say that it must be taken back as of 1994. According to the plans of the EVU [Electricity Supply Company], the glass molds are to be temporarily stored in the Gorleben transport container deposit. Proceedings to get a permit for that have been initiated. The discussion of the matter is planned for some time over the next few months.

[DIE WOCHE] A French law now prohibits storing German nuclear waste in the country—apart from recycling them. What is the consequence of that for the operation permit for nuclear power plants, which must be able to prove that they can ensure waste disposal?

[Toepfer] The law does not have any consequences. As I said, the highly radioactive waste will be taken back as of 1994, the return of the waste with low and medium levels of radioactivity is to take place as of 1997. Facilities for interim storage either already exist or are beginning to be

prepared and planned. If the Konrad final storage site is put into operation, part of the waste can be taken there directly.

The large amount of heat generated by the highly radioactive glass molds requires them to be stored above ground for several years. Then they are to be put into a final storage facility for waste that generates heat. According to Federal Government plans, such a facility is to be put into operation in the Gorleben salt mines at the beginning of the next century.

[DIE WOCHE] Has the regulation of the Nuclear Law that radioactive residual material has to be reused become obsolete because of the high costs?

[Toepfer] Together with the power companies, the Federal Government is of the opinion that the disposal of radiation-exposed fuel elements through recycling is economically justifiable, while observing more far-reaching economic requirements, such as the sparing use of resources. Various people consider the direct final storage of radiation-exposed fuel elements economically more efficient than recycling them. However, one must take into consideration that the figures on the potential advantages in terms of costs are still rather uncertain. There is no well-founded doubt as regards the basic technical feasibility of direct final storage. However, various individual aspects have still to be proved. Within the framework of the amendment to the Nuclear Law, which is currently being prepared, I intend to present recycling and direct final storage of radiation-exposed fuel elements as basically equal methods of disposal.

[DIE WOCHE] Why are the recycling contracts not canceled, if the contractual penalty does not exceed the costs of direct final storage?

[Toepfer] The contracts were concluded between the Cogema company and its German customers, therefore, they are contracts under civil law. Therefore, this question cannot be asked of the FRG environment minister.

## ITALY

#### Undersea Power Plant To Provide Electricity to Italian Southern Regions

93MI0389 Bonn DIE WELT in German 25 Feb 93 p 9

[Article by Andreas Englisch: "Electricity From the Mediterranean: Power Station To Be Built on Seabed Between Sicily and Italian Mainland"]

[Text] Neither the Po nor the Tiber river has the greatest water flow in Italy. The most powerful current under Italian sovereignty, with the greatest flow speed, surges at a depth of around 100 meters on the seabed between Punta Pezzo and Ganzirri through the Straits of Messina, separating Sicily from the Italian mainland.

This submarine current is to drive Europe's most spectacular power station. The marine research institutes in Catania and Reggio Calabria estimate that water volumes of around a million cubic meters per second are forced at speeds of three to five meters per second over the seabed through the Straits of Messina. Every six hours the tides change the current's direction. Elio Matacena, president of the Ponte d'Archimede company, states that "the German Voith company is to supply us with 100 turbines for electricity generation. We plan to build a power station on the seabed, to convert the water current into electricity." Together with three other firms, Ponte d'Archimede has set up the Enermar company, which has devised the project. Offshore technology will be used to anchor concrete blocks to the seabed, leaving open gates through which the water will flow setting in motion four sails mounted on round rotating platforms, which will drive the turbines. These sails will make efficient use of the water current when the direction of flow changes. The power station is to be constructed on the seabed for the entire three-kilometer distance separating the mainland and Sicily, and will attain an output of 100 megawatts, supplying electricity to the surrounding cities of Reggio Calabria or Messina. The worst-case price of the seabed electricity will be around one German mark [DM] per kilowatt hour; Matacena states that "if the sea current is constant and somewhat stronger than our worst-case projection, then we shall achieve a competitive price." In the best case, the price could be below 27 pfennigs. It is not yet clear, however, which of the two cities will benefit from this cheap electricity. If the EC is willing to support the project, then a pilot project will start before the end of 1993. Two turbines will initially be anchored to the seabed, at a cost of under DM60 million. "We need the pilot project to test just how strong the submarine current actually is," explains Matacena. Italian planners believe that the modest scale of the Messina Project could make it a model for a pan-European power station on the seabed of the English Channel, separating England and France. Norway has also shown interest in the project: many Norwegian fjords have a very strong seabed current.

#### Italian Firm Develops Recycled Plastic From Urban Waste

93MI0446 Milan ITALIA OGGI in Italian 15 Mar 93 p 34

[Text] We have now grown accustomed to the many surprises of recycling. However, the idea that comes from RPE of Reggio Emilia is indeed a strange one. The company has developed a plastic material (called Replex) from urban waste for use as a raw material in the construction of streetlight poles. The poles will be produced by a leading company in this sector, the Parma-based Tecnopali, which has decided to test Replex in this unheard of application as an alternative to traditional materials.

Tecnopali, with 50 billion lire in revenues and 130 employees, is one of ENEL's [National Electric Power Company] leading suppliers of streetlight poles.

"By using Replex we have developed a new product," said Tecnopali president Maurizio Grazioli. "It is a pole with a low environmental impact which is modular and can be recycled. The pole consists of several modules and because of this can assume any form wanted by the designer."

#### NETHERLANDS

##### Netherlands Researching Earth Observation Technologies

93BR0424 Rijswijk POLYTECHNISCH WEEKBLAD in Dutch 19 Feb 93 p 5

[Article by Joris Janssen Lok: "TNO (Netherlands Organization for Applied Scientific Research) Wants To Become One of the International Leaders in Earth Observation"]

[Text] Observation of the earth from space has, from the beginning, been the domain of the superpowers. The United States and Russia have their spy satellites. The French, the Germans, and the British play a leading role in European activities. But the tiny Netherlands is also catching up. TNO [Netherlands Organization for Applied Scientific Research] is developing, mainly with defense funds, a radar technology for aircraft which will be able to analyze image details which will only be accessible with satellites by the beginning of the next century.

TNO's research into earth observation technologies is specifically focused on remote sensing using synthetic aperture radar (SAR) technology. This technology provides radar images of the earth's surface of almost photograph quality under all weather conditions. Engineer Peter Hoogeboom, head of remote sensing at TNO's Physical and Electronics Laboratory in The Hague, emphasizes that TNO would like to attain an internationally leading position in the area of SAR image processing. "It concerns in particular the processing of raw radar data originating from the European Space Agency's (ESA) ERS-1 [European Remote Sensing Satellite] earth observation satellite."

The laboratory would like to set up a space image processing and archiving center. "Such a center could grow into a fully fledged Processing & Archiving Facility (PAF) for remote sensing, recognized by ESA," said Hoogeboom.

The TNO laboratory is interested in this status because it is itself involved in developing new techniques for the processing of SAR radar images.

"For that, we need raw, unprocessed data from ERS-1," continued Hoogeboom. "At the moment, we are dependent on the standard, processed images which we receive from centers abroad."

#### The Hague Laboratory Wants to Score

With its new technologies, the The Hague laboratory wants to score with the Western European Union (WEU) and the European Community. TNO is in fact a member of a consortium which is to build a new satellite center for the WEU in Torrejon, Spain. TNO is also involved in the bidding process to supply the SAR processing system for EARSEC (European Airborne Remote Sensing Capability), a project run by the EC's Joint Research Center (JRC) which will implement a Danish SAR earth observation system for aircraft.

The most tangible SAR project at TNO is Pharus, a synthetic aperture radar which should be operational by 1994. This project is funded by the Ministry of Defense together with the multi-departmental Policy Commission for Remote Sensing. Also involved are the National Air and Space Laboratory (NLR), the Technical University of Delft, and the National Institute for Aircraft Development and Space Travel.

#### Only Four Meters Across

Pharus will transmit on the C-Band at a frequency of 5.3 GHz (wavelength of 5.6 cm.). This frequency is also used by ERS-1, launched in 1990; ERS-2, to be launched in 1994-95; and Envisat [Environment Satellite], which will be launched at a later date.

This is the reason why Pharus fits so perfectly into ESA's present family of earth observation satellites. Operating from space in the C-Band, ERS-1 obtains a resolution of approximately 25 meters. "When Pharus goes up in 1994, it will even be able to see objects only four meters across," said Hoogeboom. The difference in resolution is mainly because Pharus, which will be mounted under an aircraft, will remain much closer to the earth's surface than ERS-1, which orbits at a height of 800 km. "This sort of radar resolution is about what you can expect from future satellites. Pharus therefore will enable us to gain the necessary experience with what will soon be possible on a large scale using satellites."

This is why for the future Envisat an Advanced SAR (ASAR) with an active antenna is being developed. ESA and TNO expect that post-Envisat satellites will be equipped with earth observation radars operating in the X-Band (8-10 GHz, wavelength of between 3 and 3.75 cm). They are referring to the successor to Envisat, planned to be ready by 2010, but whose construction, let alone launch, has not yet even begun (slated for 2000).

#### Better Resolution

The development of ASAR radar for the Envisat satellite, which is led by the French-British concern Matra Marconi Space, will benefit from the Netherlands Pharus

project. Hoogeboom again: "In 1995, when we are flying around with Pharus, we will be getting images from our aircraft which will be very similar to those soon to be available with ASAR. The difference in altitude between an aircraft and a satellite will then be compensated for by the better resolution which ASAR will be able to achieve."

At present, Pharus is in the construction stage and will be ready by the end of 1993. Test flights will take place during 1994. TNO has already gained experience with a prototype system called Phars, which has only eight microwave modules (Pharus has 48). Test flights were made with Phars in 1990 and 1991, suspended under the NLR's Swearingen Metro II test aircraft. The same aircraft will be used for Pharus, although Hoogeboom would prefer to see the (faster) Cessna Citation jet aircraft being used, which was purchased last year by the Technical University of Delft together with the NLR.

#### Biological Flue Gas Desulfurization System Implemented

*BR1404114593 Rijswijk POLYTECHNISCH WEEKBLAD in Dutch 2 Apr 93 p 3*

[Article by Gerard van Nifterik: "Biological Flue Gas Desulfurization System Gets Chance in Geertruidenberg"]

[Text] Balk—At the end of June, the Amercentrale power station in Geertruidenberg will launch a pilot project for a new type of flue gas scrubbing. It involves a biological process, developed by Paques BV., which will remove sulfur from the smoke produced by the coal-fired power station.

"It will be 30 percent cheaper," claims Dr. Engineer C.J.N. Buisman of the environmental technologies company Paques BV., located in Balk. "The process is about 30 percent cheaper than the conventional gypsum-based method. Not to mention the problems related to disposing of the gypsum, which has to be dumped somewhere, whereas the sulfur residue from our process simply can be sold."

In collaboration with Hoogovens, and financially backed by the Northern Development Company (NOM), Paques developed a process for removing the sulfur from the washing water in scrubbing plants. The only residue from this biological method is salable elementary sulfur.

The biological desulfurization of waste water is nothing new, but the desulfurization of washing water using the Paques method certainly is. The Paques method also requires very different process circumstances. The temperature of the waste water—about 50°C—is much higher than that of normal waste water. Its salt content, mainly NaCl, also is relatively high, which seemed reason enough to adapt the existing principle of desulfurization to the extreme washing water circumstances.

Those involved in the project have since developed a process provisionally known as Bio-FGD (flue gas desulfurization). This is a multistage process in which the washing water from the scrubber is first anaerobically purified in a Biopaq IC reactor, where the sulfur dioxide is converted into sulfide. The next aerobic step, in a Thiopaq reactor, turns this into elementary sulfur, which is purified before being sold.

Laboratory results will be confirmed from the end of June onwards. A pilot plant will be set up at the coal-fired power station in Geertruidenberg. It will handle approximately 4,000 cubic meters of flue gases per hour—1 to 2 percent of the station's total emission level. If everything goes according to plan, the system's capacity will be increased after a year of experimental operation.

## NORWAY

### Research on Minke Whale Detailed

93EN0380A Oslo AFTENPOSTEN in Norwegian  
14 Apr 93 p 13

[Article by Torill Nordeng: "Migration of Female Minke Whales"—first two paragraphs are AFTENPOSTEN introduction]

[Text] Four whaling cutters will head for the Barents Sea today. For the second year in a row Norway will catch whales for research purposes in order to chart the role of minke whales in the ocean's ecosystem. The starting date of the hunt is a secret. Environmental activists lurk in the background. Those involved in the whaling activity are prepared for trouble.

The quota is 136 whales. The researchers are especially interested in female whales. During last year's hunt fetuses were found in 18 of the 41 females. But no one knows where mating and birth occur. Marine biologists admit that they know very little and are hoping for new research results.

No one knows where she comes from or where she is swimming, but she arrives with the wagtail. In March-April the first dark glistening backs appear along the Norwegian coast. In the words of the researchers:

"In the summertime the North Atlantic minke whale has a distribution range from the temperate waters as far down as 40-50 degrees north up to the edge of the ice cap."

It has been ascertained that the whales thrive best in shallow ocean areas—where the food is.

But the researchers know deplorably little, marine biologist Tore Haug of Tromso University (UIT) admitted. For the second year in a row he is heading the big research whaling project that starts today. The assignment is to chart the minke whale's role in the ecological system.

He would not tell us exactly when, how, and with which boats the whaling will be carried out. For a "whale war" is a possibility. Activist Paul Watson of Greenpeace and others consider such abominations intolerable.

Haug and the 40 others on board the four whaling cutters do not know what awaits them in the course of the season. But they are prepared for trouble and are taking precautions.

It is lack of knowledge and the need for broader data on which to base political decisions that have led them to embark on what is probably the most unpopular ocean voyage they have ever taken.

"We have a quota of 136 animals," Haug said. He did not conceal the fact that there will be many tons of whale meat to process, but that will come after he has done his part of the job.

### Messy Job

They will be working with numb fingers on the dirty deck in foul weather. Determining the weight, length, and sex is only the preliminary part of the investigation. All the internal organs are equally important to the researchers.

The heart, lungs, liver, and kidneys are dissected and subjected to biochemical analysis. The uterus and ovaries are no less interesting. Female whales often contain fetuses. In the period from 1943 to 1973, 188 mature females were caught in Lofoten and the Barents Sea. More than 96 percent of them were pregnant. During last year's research expedition fetuses were found in 18 out of 41 females. As far back as 1938 there has been a directive to determine the sex of animals that were caught.

"The natural assumption is that the minke whale normally gives birth once a year and comes up to Norwegian waters several months before the young are born. Therefore there will be many fetuses in the haul," Haug said.

During last year's research voyage the researchers observed something new. More mature females were not pregnant. Can this mean that the population has now grown so large that a self-regulating mechanism has gone into effect? That there is not enough food for more animals and therefore they are not mating? Haug hopes to know more about this after this year's expedition.

It is important to chart the minke whale's reproductive capacity before deciding how many can be caught. That is the reason for this special scientific interest in the females. It is also possible to determine whether a female has been pregnant earlier. As in all other female mammals the eggs are formed in the ovaries. When an egg is released from the ovaries and fertilized, a so-called corpus luteum is formed. The researchers will look for remains of these. By counting them, they will find out how many eggs the female has released previously.

Milk-filled teats also tell whether a birth has taken place. The young minke whales, calves as they are known

technically, are around 2.80 meters long when they are born. No one knows where the birth occurs, not to mention where mating takes place.

The researchers regard analysis of the stomach contents as important. It tells them what is on the menu. Blood samples, a section of the brain, eyes—it is all brought home to the laboratories. On the whole a very thorough job is done before the mountain of meat is delivered to Arnfinn Ellingsen in Skrova or Gunnar Klo in Myhre in Vesterålen. That is where the research catch ended last year. Haug does not yet know where the meat will be delivered this year. There are no longer many people who accept delivery of whale meat.

#### Mother and Child

Mother minke whale is probably pregnant for 10 months and nurses her calf for four months, one can read in the numerous research reports. It is assumed that the female is sexually mature when she is 7.15 meters long and around seven years old.

The males in the minke whale family grow up a little faster. They are ready to mate when they are six years old, but are somewhat shorter than the females all their lives. A full-grown female minke whale has an average length of 8.50 meters, the males average around 7.90 meters. This has been shown by measurements of animals that have been caught.

"The total life span of the animals has not been established, but several have been found to be older than 25, so 35-40 years is not unrealistic," marine biologist Ivar Christensen wrote in OTTAR's special issue on the minke whale (OTTAR is UIT's popular science periodical).

It is said that the popular movie series on Flipper, the dolphin, has led many people to attribute to the minke whale a near-human intelligence and a social life that we humans must not disturb.

No one knows for sure what an animal feels when its blood flows and the end is near. Veterinarian Egil O. Oen is concerned about these questions. Therefore he has worked with engineers to develop the most efficient weapon possible to use in catching minke whales: a shell that explodes when it has penetrated to a certain depth within the animal. This supposedly leads to instant death if the marksman knows his job.

Records from the 1984-85 season showed that 50 percent of the whales died immediately, 20 percent lived for more than 10 minutes. In the research haul of 95 whales, 50 percent also died at once, while 8 percent survived for more than 10 minutes after they were shot.

"But these figures are not absolute," said Oen and elaborated: "The fact that only 50 percent of the animals die immediately does not mean that all the rest suffer. Animals that have been shot unconscious may have reflex movements but feel no pain. However they are not

recorded as immediate deaths. For the purpose of establishing the moment of death total immobility is required."

In the regulations for minke whale catches a maximum firing distance of 30 meters is recommended. As far as possible the marksman must aim straight at the side, not from the front or the rear. The animal must be pulled to the side of the ship at once and shot in the neck with a rifle if it is not already dead.

The marksman must take a special firing test under realistic conditions at sea. He must also pass a firing test for big game hunters using a rifle.

Oen's explosive shell is recommended for killing minke whales by the International Whaling Commission. The shell is also used by Icelanders and Greenlanders.

#### Migration Route

The pregnant females come north first. When the latest calf is about four months old, the mother probably leaves it in warmer waters. The males come later in the summer. They gorge themselves on herring, pollack, haddock, cod, krill, and capelin. The menu changes gradually as they swim northward and varies according to the seasonal selection of raw material.

The North Atlantic minke whale population, estimated at around 86,000, would consume at least 220,000 tons of herring if they were all off the coast of northern Norway during one summer month. This is shown by mathematical models. Some 200 liters of water and food disappear into their toothless jaws. The water is strained out again through the whalebone.

They come north solely to eat. A few are also observed in the wintertime, the majority disappear again. Where?

"As a result of the limited number of observations in both southwestern and southeastern parts of the North Atlantic it is currently impossible to say whether the North Atlantic minke whales congregate in special winter gathering spots where mating and calving occur or if the animals are thinly distributed over the vast areas of the southern North Atlantic," whale population expert Lars Folkow wrote in the special issue on the minke whale.

#### Whale in Sight

Before boats acquired engines and Svend Foyn's harpoon was still on the drawing board (Foyn was born in 1809), whales were caught by coastal residents. The whale entered the bay (fjord) on its way north, which is the origin of the Norwegian name, bay whale. The catch method consisted of shutting the animal in with a barrier net, frightening it further inward, and poisoning it with an arrow. When blood poisoning set in and the whale was exhausted it could be dragged up on the shore, the blood was drawn off and the whale was flensed and

divided up. Quality control consisted of putting the meat in water. If it sank to the bottom it was edible. If it floated it was spoiled.

Minke whaling did not really take off until fishing boats acquired harpoons. The whalers went out in Vest Fjord, shot an animal, and dragged it onto the rocky shore for flensing. Because of its short distance from the catch area Skrova was much used as a flensing location. Later it became the country's biggest reception area for minke whale meat.

#### Good and Healthy

N-3 fatty acids can give life a new dimension without cardiac infarction and other cardiovascular diseases. The fat and meat of the minke whale contain quantities of these polyunsaturated fatty acids which have spared the Eskimos from all heart problems.

Haug suspects that a big new diet fad could be the minke whale's biggest enemy and then the animal will be in real danger. A modest annual quota that can be supervised does not present any threat to the population, in his opinion. But if whale meat becomes the road to good health, strong pressure groups could drive up demand.

And who will put protecting the minke whale above his own health?

#### Government 'Not Panicking' Over Russian Submarine Wreckage

BR1504140693 Oslo AFTENPOSTEN in Norwegian  
14 Apr 93 p 2

[Report by Ole Mathismoen: "Norway Wants To Know More—Move Concerning Submarine Komsomolets"]

[Text] The Norwegians are not panicking over the Kremlin's claim that the disabled submarine Komsomolets is a ticking time bomb.

"We believe that it is best that the submarine remain where it is. This is based firmly on the knowledge currently at our disposal. We intend, at the earliest opportunity, to ask the Russians to provide us with any new information that they might have," said Ole Harbitz, director of the National Radiation Defense Unit. The submarine was disabled on 7 April 1989.

"The Norwegian authorities ought to realize as soon as possible that they no longer can pretend that there is no problem with the Komsomolets. If the Russians are so concerned, Norway ought to change its strategy drastically. Otherwise our fish companies will find it very strange," says Bellonas [not further specified] leader Frederic Hauge, a board member of the Komsomolets Foundation—the international foundation working on potential sources of [radioactive] contamination at sea.

Ingvar Havnen, press secretary in the Ministry of Foreign Affairs, believes that the Komsomolets will be one

of the topics that Norwegian Foreign Affairs Minister Johan Jorgen Holst will raise during his visit to Russia next week.

For Norway, the disabled submarine represents as much of a psychological as a physical problem. The authorities are concerned that Norwegian fish could be tarnished by the reputation of being radioactively contaminated. Even a rumor to this effect could have catastrophic consequences for Norwegian fish exports. Consequently, the Norwegian authorities have been extremely careful to attract as little attention as possible to the subject of the Komsomolets.

On the basis of what the Russian authorities have said about the submarine's contents and of samples taken from around the wreck, Norwegian nuclear experts have stated categorically that it is best to leave the Komsomolets exactly where it is. It is inadvisable to raise it because of the danger of radioactive contamination at depths where marine life is more abundant. As part of their strategy, the Norwegian authorities have shunned international interest in the submarine, not having anything whatsoever to do with the Komsomolets Foundation.

The question is how long can this strategy be maintained. Following the statement by Boris Yeltsin's environmental adviser, Aleksey Yablokov, in an interview with AFTENPOSTEN that the Komsomolets is a ticking time bomb, and his request for Western aid to do something about it, it may be difficult to continue the Norwegian policy of making a minimum fuss.

Ole Harbitz says that the Norwegian attitude is based on neither tactical nor strategic considerations, but rather on facts.

"Before we can assess whether to change our minds, we must have more documentation on the submarine. We have asked Moscow to provide some, but have received nothing. I see that Yablokov's preference is to encapsulate the submarine using special torpedoes. An operation of this kind will not be carried out without our consent. However, ultimately it will be a cost-benefit question." According to Harbitz, the question is whether it is a good idea to start dealing with a submarine lying at a depth of 1,700 meters when there are 17 reactors at depths of, say, 25 meters in the Kara Sea.

#### Mixed Motives

Frederic Hauge is right at the center of the controversy. As a board member of the Komsomolets Foundation, he is Norway's sole representative in the heart of the international deliberations. He is joined on the board by Netherlands industrialists and politicians, formerly prominent figures in the Soviet Union's Navy, including the former admiral of the northern fleet, and none other than Igor D. Spasskiy—the man who constructed most of Russia's nuclear submarines.

Hauge is the first to admit that the Russians have mixed motives for taking up the Komsomolets affair: "On the

one hand, they genuinely are concerned about the plutonium in the two torpedoes and one of the reactors. Another motive is that Russian industry desperately needs orders. The industry, builders—indeed the whole “apparatus”—hitherto involved in rearmament is out of work. The people in charge see cleaning up the ocean floor as a possible solution,” claims Hauge.

At the same time, he strongly warns the Norwegian authorities against making light of Yablokov’s moves: “If the Norwegian authorities downplay his assessment, it will be easier for the Russian Armed Forces, which currently have great respect for him, to do the same. This could result in a freeze in cooperation concerning the fate of the nuclear reactors in the Kara Sea, in the Kola peninsula, and everywhere else where there is military nuclear waste.”

“The Norwegian authorities should deal with the situation realistically rather than how they would like it to be, and enter into a dialogue about what is to be done with the Komsomolets. The policy of continuing to maintain that there is no danger will be met with disbelief abroad if the submarine’s builders claim the opposite—regardless of the motives that they might have for making such a claim. Neither the Komsomolets Foundation nor the Russian authorities have any plans to raise the submarine in its entirety. So, we no longer need to fear that this is the case,” says Frederic Hauge.

## SWEDEN

### Dramatic Decrease in Sulphur Emissions Seen

*93WN0371A Stockholm DAGENS NYHETER  
in Swedish 22 Mar 93 p 5*

[Article by Erika Bjerstrom: “Eighty Percent Less Sulphur”]

[Text] The environmental tax is the primarily reason for the decreased emission of sulphur in Sweden. The emission of sulphur, which acidifies forests and fields, has decreased markedly in Sweden. According to a recent report, the decrease has been close to 80 percent since 1980. On the other hand, the decrease in the emission of nitrogen is not going well, and this causes, among other things, the overfertilization of the Baltic Sea.

The sulphur emission has decreased primarily thanks to a new environmental tax on sulphur. The emission of nitric oxide is decreasing very slowly, in spite of catalytic converters and large cleansing efforts in industry. In the next few days the Environment Department and the Central Office for Statistics will present figures on how well Sweden is reducing its emissions. In international agreements, Sweden has agreed to reduce the emission of both sulphur and nitric oxide.

The sulphur emission is to be lowered by 65 percent by 1995 compared to the 1980 emission level. This goal has

been reached way ahead of time. The next goal, to decrease the emission by 80 percent by the year 2000, has almost been reached.

### Slower Abroad

Unfortunately, things are not going as well in the other European countries that agreed to reduce their sulphur emissions. This means that the fallout over Sweden has only decreased by 20 percent. Acidifying winds sweep in mainly from Great Britain, eastern Europe, and Germany and fall out over Swedish areas that belong to Europe’s most sensitive to acidification.

According to the Environment Department, the progress is due to the sulphur tax that was introduced in 1991. This caused the industries to go over to cleaner oil with less sulphur content. The heavy traffic on the roads accounts for 40 percent of the decrease.

Environmental classification of oil has meant that diesel with better environmental qualities, including lower sulphur content, has come on the market. In addition, the sulphur content of coal has decreased. The majority of the country’s coal-driven plants also have some form of sulphur reduction.

### Environmental Scandal

The chemical industry is responsible for the greatest decrease in sulphur emission. On the other hand, the mineral industry increased its emission because of an environmental scandal in Gotland. There it was discovered that Cementa’s cement factory in Slite had a sulphur emission that was 10 times higher than what had earlier been thought. The reason is that the sulphur content in Gotland’s limestone is higher than what had been believed. Besides this, the factory is the country’s leader in the emission of nitric oxide. In 1993 the environmental authorities will decide upon new emission requirements for Cementa’s factory.

### Nitrogen the Difficult Child

Nitrogen, which both acidifies and overfertilizes, is one of the environmental policy’s difficult children.

Sweden has agreed to lower the emissions by 30 percent by the year 1995. Up to now, emissions have decreased by a modest 8 percent. Traffic is still responsible for the largest part. Emissions from vehicles, ships, and work machines are responsible for 80 percent of the total.

Emissions increased until 1990, but have now begun to decrease somewhat. The cleansing effect of catalytic converters has been eaten up by the increasing flood of traffic. Air and sea traffic also increased their emissions at the end of the 1980’s. According to the Environment Department, Sweden will not be able to reach the goal by 1995. The environmental charges that were introduced in 1991 have not had any noticeable effect yet.

### Fallout Acidifies Nature

The reduction of the sulphur emissions is, from an international point of view, impressive. But to get down to the levels that nature will bear, the fallout of sulphur and nitrogen must decrease by 70 percent. Otherwise, acidification will continue.

Sweden is therefore dependent upon strong efforts by Great Britain and eastern Europe to lower their sulphur emissions.

Twenty percent of all wooded areas in Sweden have been damaged by pollution, and an equally large part of our lakes and rivers. In spite of the fact that pollution seldom creates any headlines anymore, it is one of Sweden's most serious environmental problems.

Besides the fact that sulphur damages coniferous forests and kills life in lakes, pollution also removes nutritional elements from the earth. This makes bad conditions for growing forests.

### New Proposal to Remove Communal Veto, Impose Life Imprisonment for 'Gross' Violations

*93WN0371B Stockholm DAGENS NYHETER  
in Swedish 1 Apr 93 p 5*

[Article by Thomas Michelsen: "Environmental Violation Can Mean Life Imprisonment"]

[Text] Shore protection and communal veto are being loosened up in new proposals.

The Environmental Protection Committee is proposing that shore protection be loosened up, that the communal veto right against, among other things, large traffic routes and waterways be removed, and that the punishment for gross environmental violations could be life imprisonment.

Other news is that an environmental ombudsman's position will be established in the Environment Department and that quality norms will be created for the environment.

The committee's main accomplishment has been to collect a series of various laws concerning environment, protection of nature, chemical products, and protection against radiation into one law. It has been named "balk" after the old Swedish prototype of a legal code, the Environment Balk, or Code.

Most of the content in this environment code has already been known. But now all the legal regulations have been collected into one place. In addition, the committee suggests that the criminal code be changed so that the punishment for disturbing the environment can be up to life imprisonment.

### The Veto a Bone of Contention

Normally, the punishment is a maximum of six years imprisonment for causing danger to human life or health

by polluting or spreading poison or other chemical or biological products. But if the violation is gross, that is, if it is very dangerous or ruthless, the punishment is to be up to life imprisonment.

The great bone of contention in the new environmental code will certainly be the communal veto. Today, a community can stop a traffic route with its no, thus, for example, Hanige Community has done this for the planned new Rodkobbs route for Finland's ferries through the archipelago.

But the committee thinks that no community should retain this right anymore to stop a traffic project that is of national interest. Therefore the government could give permission for motor, railroad, and sea courses even when an affected community says no.

### Reservation

However, one of the governing parties, the Center Party, has reservations against this proposal. And it is precisely Center's foremost minister, Environmental Minister Olof Johansson, who will in due course write the proposal in question. We may expect lively discussions at the government's table.

The Left Party also has reservations about the removal of the communal veto.

### Communal Right

Shore protection has been a hot question in the considerations. Finally the proposal was made that the communities will have the right to revoke shore protection, that is, the prohibition of building closer to the shore than 100 meters, and in some cases, 300 meters. Today, only the county administrative board has the right to allow such a deviation from shore protection. But the committee thinks that the community in its detailed plan should also be able to reject shore protection.

The Agency for Administrative Development has shown in a study that the communities usually are more willing to allow construction along the shores than the county administrations are.

The Social Democrats say that they are doubtful about this regulation, but they approve it nevertheless. The Moderates, on the other hand, say that they would like to have seen more construction permitted along the shores that are now protected.

### Continued Debate

The debate on shore protection continues. Among other environmental protection organizations there is criticism of the communities having greater leeway in allowing construction along the shores.

The committee's proposal will now be sent out for feedback. In the opinion of the chairman, Justice Staffan Vangby, the new law cannot go into effect until 1996 at the earliest.

But in this case everything will have to go like clockwork. And it is clear that disagreement is still great on important main points.

## UNITED KINGDOM

### UK To Test Underwater Turbine

*93WS0313B Paris AFP SCIENCES in French  
18 Feb 93 p 20*

[Text] London—After tidal-powered factories and wave and river energy, the advent of underwater turbines that use the energy of ocean currents to generate electricity is almost upon us. At least it is in Great Britain where, early this summer, engineers of the IT Power of Eversley company in Hampshire are going to test the new concept at the mouth of a loch on the western coast of Scotland.

According to specialists of the Harwell Energy Technology Support Unit, who are cited by THE TIMES of London, this type of turbine could meet up to 17 percent of Britain's energy needs. The turbines use the currents along the coasts, which run as fast as 3 meters a second.

If the scheduled test is conclusive, the concept could also be used extensively abroad. The trial will be conducted jointly by Britain's engineering laboratories and Scottish Nuclear, which is underwriting most of the cost.

The system employs a mooring buoy, to which a turbine and its electrical generator are attached at a depth of six meters. The turbine will be driven by a two-blade propeller moved by the current. The concept, its promoters stress, is based on necessary existing technologies.

### Shipowners Agree to Code of Conduct To Cut Oil Pollution

*93WN0353A London THE DAILY TELEGRAPH  
in English 23 Mar 93 p 9*

[Article by Toby Moore, transport correspondent]

[Text] Ship owners have agreed a code of conduct to reduce the risk of pollution from tankers running aground on the British coastline.

The agreement follows the spillage of 85,000 tonnes of crude oil into the seas off Shetland from the tanker Braer in January, and comes in advance of conclusions from the Department of Transport inquiry into the incident.

The voluntary code, drawn up by the British Chamber of Shipping, incorporates standards for specific stretches of sea, with guidance on navigating in difficult waters.

Dr. Les Atkinson, vice-president of the chamber and chairman of BP shipping division, said the code attempted to deal with poor quality operation by setting navigation requirements around sensitive areas, such as Shetland, the Minches and the Scilly Isles.

"Any ship owner who disregards this guidance and causes a pollution incident is going to have an impossible task establishing in the courts that he was operating his vessels in a prudent and competent manner," he said.

The chamber said only 10 percent of oil in the sea originated from ships. United Nations estimates suggested that the rest ran off land.

There are 182 oil tankers in the British-registered merchant fleet, about three percent of the world total.

### Ministry Takes Steps To Protect Environment

*93WN0367A London THE DAILY TELEGRAPH  
in English 27 Mar 93 p 8*

[Article by Robert Bedlow]

[Text] Organic farming was given Government backing yesterday when Mr. Gummer, Minister for Agriculture, said that farmers and landowners will receive incentives to phase out the use of damaging fertilisers and pesticides.

In a pound sterling 31 million package to protect the countryside, the Ministry of Agriculture, Fisheries and Food is proposing to introduce payments for creating and improving wildlife habitats that not only encourage organic farming, but allow the public access to farmland taken out of production.

The consultation document also proposes the creation of six new Environmentally Sensitive Areas (ESA); a Moorland Scheme reducing livestock grazing to improve heather and other vegetation and habitats; a Meadowland Scheme providing access on set-aside land and a Habitat Improvement Scheme for coastal saltmarsh and water-fringes.

The move to encourage organic farming follows the publication of the Prince of Wales's book, based on his experiments at his Gloucestershire estate, Highgrove, which has been given over entirely to the organic system of farming.

Mr. Gummer, a convert who practises the system at his home in Winston, Suffolk, said: "I am making proposals for an Organic Aid Scheme to encourage organic farming, to the benefit of the environment and to encourage a type of food production for which there is a clear demand."

The scheme would be implemented over five years and open to farmers and growers who agree to change, with higher payments in the first two years to reflect the loss of income.

It would be limited to 750 acres per unit with a minimum of 25 acres.

He said he wanted to encourage a form of production which "emphasises soil improvement and the control of pests and diseases by making use of the very restricted

range of fertilising materials and plant protection products permitted by the EC and the United Kingdom Register of Organic Food Standards."

The high toxicity of pesticides, considered essential for efficient farming on a scale no longer required, has been blamed for the decline of much of the country's wildlife.

Mr. Gummer said the proposals also aimed to sustain and develop the existing market for organic products and deliver a regular and consistent supply to markets.

Payments are also proposed to help farmers to conserve and enhance special habitats, landscape and features of historical interest, and provide access to the public.

The six new ESAs are to be in the Blackdown Hills, the Cotswolds, Dartmoor, the Essex Coast, the Shropshire Hills and the Upper Thames Tributaries. It will bring the total of ESAs in England to 22.

Most conservation groups welcomed Mr. Gummer's proposals, but with reservations.

The Royal Society for the Protection of Birds said it was "excellent news for wildlife."

The Council for the Protection of Rural England said that it should be a great day for the countryside, but MAFF has ignored some options while "pursuing others that are merely trying to undo damage done by other policies."

Friends of the Earth said the proposals "offered little cheer" and the amount of money on offer was not enough.

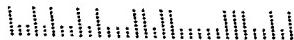
The Ramblers' Association said it welcomed any measures that allowed more people to walk in the countryside. Assistant director, Mr. David Baskine said: "It is important that the proposals will not offer payment to farmers who own land where public access is already allowed."

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